Workshop Lessons
KY Core Content and Program of Studies

Stormwater Education Toolkit for Schools Binder

If it's on the ground it's in your water

Globe Toss: Percentage of Earth that is Water and Land

Materials:

- One plastic (blow-up) globe
- Chart paper or white board and marker

Procedures:

1. Set up a flipchart or whiteboard with two columns – Label one column "Land" and the other column "Ocean".

2. Have participants count off by 2's and form two lines facing each other.

3. Toss the plastic globe to the first participant in one of the lines. Have him or her tell you whether his or her right thumb is on land or ocean. Record the response on the whiteboard in the appropriate column.

4. Have this person toss the globe to the person across from him or her in the other line and repeat number 2 above.

5. Continue with the globe toss until each person has caught the globe once (or twice, for smaller groups).

6. Call attention to the tallies under each column on the flipchart, asking the participants for a total count of the number of times the right thumb landed on land and on ocean. Record this number at the bottom of each column.

7. Ask participants to calculate the percentage of land and ocean from the activity.

8. Ask what percentage of the earth is oceans. Compare this actual percentage to the percentage calculated in the activity. (The percentages should be fairly close). The activity can be repeated, combining the results, to get a more accurate number.

Lead in to Next Activity: Water, A Drop in the Bucket

1. Ask where we find water on earth other than in the oceans. (Lakes, streams, etc.)

2. Ask what the difference is between ocean water and the other water sources on earth (saltwater vs freshwater)

3. Tell participants that you are now going to do another activity to determine what percentage of all of the water on earth is able to be used by humans for drinking, bathing, cooking, etc.

"Drop in a Bucket" Activity

Before lesson starts:

1) Assemble students in groups of 4
2) Use bucket kits from toolkit and hand out one liter containers
3) Put one drop of food color in beaker water
4) Run powerpt - on website at http://www.stormwater.kytc.ky.gov/MCM1/mcm1_targetaudiences_schools.html#SchoolCurriculum

1. Using the graduated cylinder, measure 1 liter (How many ml are in a liter?) of water into the beaker or pitcher. This represents all of the water on Earth. Where is most of the water on Earth located?

2. Pour 30 ml of the liter of water into your graduated cylinder. This represents Earth's fresh water, which is about 3% of the total. The remaining 970 ml (97%) of water represents salt water found in oceans.

3. Pour 10 ml of fresh water from the graduated cylinder into a plastic cup. The 20 ml of water left in the graduated cylinder represents water that is frozen in ice caps and glaciers. The remaining 10 ml of water represents non-frozen fresh water. Only 2.5 ml of this is surface water; the rest is underground.

4. What are some reasons why the 10 ml of fresh water left may be unfit or unusable for human consumption and use?

5. Use an eyedropper to take one drop of water from the remaining 10 ml and release one drop on your lab table. This represents clean, fresh water that is not polluted or otherwise unavailable for use. This precious drop, about .003 % of the total of all water on Earth, must be managed properly.

Similar activity in other resources

Splashing in KY – page 2., Water, Water Everywhere and Only a Drop to Drink, for primary age.

Project WET - A Drop in the Bucket - p. 238;

A Drop in the Bucket
KY Core Content and Program of Studies

Elementary

K-2:

Mathematics Core Content

MA-EP-1.1.1 Students will:
• apply multiple representations (e.g., drawings, manipulatives, base-10 blocks, number lines, expanded form, symbols) to describe whole numbers (0 to 9,999):
• apply multiple representations (e.g., drawings, manipulatives, base-10 blocks, number lines, symbols) to describe fractions (halves, thirds, fourths);
• apply these numbers to represent real-world problems and
• explain how the base 10 number system relates to place value. DOK 2

MA-EP-1.2.1 Students will apply and describe appropriate strategies for estimating quantities of objects and computational results (limited to addition and subtraction). DOK2

MA-EP-1.3.1 Students will analyze real-world problems to identify appropriate representations using mathematical operations, and will apply operations to solve real-world problems with the following constraints:
• add and subtract whole numbers with three digits or less;
• multiply whole numbers of 10 or less;
• add and subtract fractions with like denominators less than or equal to four and
• add and subtract decimals related to money. DOK 2

Mathematics Program of Studies

MA-P-NPO-U-1
Students will understand that numbers, ways of representing numbers, relationships between numbers and number systems are means of representing real-world quantities.

MA-P-NPO-U-2
Students will understand that meanings of and relationships among operations provide tools necessary to solve realistic problems encountered in everyday life.

MA-U-P-M-3
Students will understand that computing fluently and making reasonable estimates increases the ability to solve realistic problems encountered in everyday life.

Additional Elementary Math Correlations

MA-EP-4.1.1 Students will analyze and make inferences from data displays (drawings, tables/charts, tally tables, pictographs, bar graphs, circle graphs with two or three sectors, line plots, two-circle Venn diagrams). DOK 3

MA-04-4.1.1
Students will analyze and make inferences from data displays (drawings, tables/charts, tally tables, pictographs, bar graphs, circle graphs, line plots, Venn diagrams). DOK 3

MA-05-4.1.1
Students will analyze and make inferences from data displays (drawings, tables/charts, tally tables, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs). DOK 3

MA-EP-4.1.2
Students will collect data.

MA-04-4.1.2
Students will collect data.

MA-05-4.1.2
Students will collect data (e.g., tallies, surveys) and explain how the skills apply in real-world and mathematical problems.

MA-05-1.1.1
Students will:
• apply multiple representations (e.g., drawings, manipulatives, base-10 blocks, number lines, expanded form, symbols) to represent whole numbers (0 to 99,999,999);
• apply multiple representations (e.g., drawings, manipulatives, base-10 blocks, number lines, symbols) to describe commonly-used fractions, mixed numbers and decimals through thousandths;
• apply these numbers to represent real-world problems and
• explain how the base-10 number system relates to place value. DOK 2

MA-05-1.2.1 Students will apply and describe appropriate strategies for estimating quantities of objects and computational results in real-world problems. DOK 2

Additional Math Program of Studies

MA-P-DAP-U-2
Students will understand that the collection, organization, interpretation and display of data can be used to answer questions.

MA-P-DAP-U-2
Students will understand that the collection, organization, interpretation and display of data can be used to answer questions.

MA-4-NPO-U-1
Students will understand that numbers, ways of representing numbers, relationships between numbers and number systems are means of representing real-world quantities.

MA-5-NPO-U-1
Students will understand that numbers, ways of representing numbers, relationships between numbers and number systems are means of representing real-world quantities.

MA-5-NPO-U-3
Students will understand that computing fluently and making reasonable estimates increases the ability to solve realistic problems encountered in everyday life.

MA-5-DAP-U-2
Students will understand that the collection, organization, interpretation and display of data can be used to answer questions.

Extension Math Content
MA-EP-4.3.1 Students will pose questions that can be answered by collecting data.

MA-EP-4.1.2 Students will collect data.

MA-04-4.1.2 Students will collect data.

MA-EP-1.3.1 Students will analyze real-world problems to identify appropriate representations using mathematical operations, and will apply operations to solve real-world problems with the following constraints:
- add and subtract whole numbers with three digits or less;
- multiply whole numbers of 10 or less;
- add and subtract fractions with like denominators less than or equal to four and add and subtract decimals related to money. DOK 2

MA-04-1.3.1 Students will analyze real-world problems to identify appropriate representations using mathematical operations, and will apply operations to solve real-world problems with the following constraints:
- add and subtract whole numbers with four digits or less;
- multiply whole numbers with two digits or less;
- divide whole numbers with three digits or less by single-digit divisors (with or without remainders);

• add and subtract fractions with like denominators less than or equal to 10 and
• add and subtract decimals through hundredths. DOK 2

MA-05-1.3.1 Students will analyze real-world problems to identify appropriate representations using mathematical operations, and will apply operations to solve real-world problems with the following constraints:
• add, subtract, multiply, and divide whole numbers (less than 100,000,000), using technology where appropriate;
• add and subtract fractions with like denominators through 16, with sums less than or equal to one and
• add and subtract decimals through hundredths. DOK 2

Science Core Content
SC-EP-4.7.1
Students will describe the cause and effect relationships existing between organisms and their environments**.**

SC-04-4.7.2
Students will:
- describe human interactions in the environment where they live;
- classify the interactions as beneficial or harmful to the environment using data/evidence to support conclusions.

All organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms; other changes are beneficial (e.g., dams benefit some aquatic organisms but are detrimental to others). By evaluating the consequences of change using cause and effect relationships, solutions to real life situations/dilemmas can be proposed. DOK 3

Science Program of Studies
SC-4-I-U-3
Students will understand that people impact their environment in both beneficial and harmful ways. Some of these impacts can be predicted, while others cannot.

SC-4-I-S-3
Students will observe, document and describe human interactions that impact the local environment.

Social Studies Core Content
SS-EP-4.2.1 Students will describe places on Earth's surface by their physical characteristics (e.g., climate, landforms, bodies of water).

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SS-P-GC-U-2	**SS-P-GC-S-2**	*SS-EP-1.3.1*

Students will understand that citizens of local communities have certain rights and responsibilities in a democratic society.	Students will explore personal rights and responsibilities: **a)** explain, demonstrate, give examples of ways to show good citizenship at school and in the community (e.g., recycling, picking up trash) **b)** describe the importance of civic participation and locate examples (e.g., donating canned food to a class food drive) in current events/news	*Students will define basic democratic ideas (e.g., liberty, justice, equality, rights, responsibility) and explain why they are important today.* **SS-EP-1.3.2** **Students will identify and give examples of good citizenship at home, at school and in the community (e.g., helping with chores, obeying rules, participating in community service projects such as recycling, conserving natural resources, donating food/supplies) and explain why civic engagement in the community is important.** **DOK 2**

Social Studies Program of Studies
SS-P-G-S-1

Students will develop an understanding of patterns on the Earth's surface using a variety of geographic tools (e.g., maps, globes, charts, graphs).

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
SS-4-GC-U-3 **Students will understand that all citizens of Kentucky have rights and responsibilities as members of a democratic society, including civic participation.**	**SS-4-GC-S-2** **Students will explore rights and responsibilities:** **a) describe, give examples, and compare rights and responsibilities** **b) describe the benefits of citizenship and find examples of citizenship in current events/news media**	*SS-04-1.3.1* *Students will identify the basic principles of democracy (e.g., justice, equality, responsibility, freedom) found in Kentucky's Constitution and explain why they are important to citizens today.* *DOK 2* *SS-04-1.3.2* *Students will describe specific rights and responsibilities individuals have as citizens of Kentucky (e.g., voting in statewide elections, participating in state service projects, obeying state laws) and explain why civic engagement is necessary to preserve a democratic society.* *DOK 2*

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
SS-5-GC-U-5 **Students will understand that as members of a democratic society, all citizens of the United States have certain rights and responsibilities, including civic participation.**	**SS-5-GC-S-4** **Students will investigate the rights and responsibilities of U.S. citizens:** **a) describe and give examples of specific rights guaranteed to all U.S. citizens in the Bill of Rights (e.g., freedom of religion, freedom of speech, freedom of press) and explain why they are important today** **b) describe some of the responsibilities U.S. citizens have in order for democratic governments to function effectively (e.g. voting, community service, paying taxes) and find examples of civic participation in current events/news (e.g., television, radio, articles, Internet)**	*SS-05-1.3.2* *Students will describe specific rights and responsibilities individuals have as citizens of the United States (e.g., voting in national elections) and explain why civic engagement is necessary to preserve a democratic society.* *DOK 3*

PRACTICAL LIVING

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
VS-P-CD-U-3 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-P-CD-S-4** Students will describe how consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by: **a)** describing some community activities that promote healthy environments	**PL- EP-3.1.4** Students will identify consumer actions (reusing, reducing, recycling) that impact the environment. DOK 1

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
VS-4-CD-U-4 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-4-CD-S-4** Students will evaluate consumer actions (e.g., reusing, reducing, recycling) and how they influence the use of resources and impact the environment by: **a)** describing how consumption, conservation, and waste management practices are related **b)** identifying ways the physical environment is related to individual and community health	**PL-04-3.1.4** **Students will identify and describe consumer actions (reusing, reducing, recycling) that impact the environment.** **DOK 2** *PL-04-3.1.5* *Students will identify and explain the available health and safety agencies in a community that provide services:* • *Health department* • *Fire department* • *Sanitation* • *Police* • *Ambulance services*

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
VS-5-CD-U-4 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-5-CD-S-4** Students will describe how consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by: **a)** describing some community activities that promote healthy environments	**PL-05-3.1.4** **Students will describe consumer actions (reusing, reducing, recycling) and identify ways these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste)** **DOK 2** *PL-05-3.1.5* *Students will identify and describe* *the available health and safety* *agencies in a community that* *provide services:* • *Health department* • *Fire department* • *Sanitation* • *Police* • *Ambulance services*

Other Practical Living Program of Studies

VS-4-CD-U-5
Students will understand that an individual has multiple life roles that impact responsibility to be a valuable family and community member.

VS-5-CD-U-5
Students will understand that an individual has multiple life roles that impact responsibility to be a valuable family and community member.

Middle School

Mathematics Core Content

MA-06-1.2.1 Students will estimate to solve real-world and mathematical problems with whole numbers, fractions, decimals and percents, checking for reasonable and appropriate computational results. DOK 2

MA-06-1.3.1 Students will add, subtract, multiply and divide whole numbers, fractions and decimals to solve real-world problems and apply order of operations to simplify numerical expressions. DOK 2

MA-06-2.1.2 Students will estimate measurements in standard units including fractions and decimals.

MA-07-1.2.1 Students will estimate to solve real-world and mathematical problems with fractions,decimals and percents, checking for reasonable and appropriate computational results.

MA-07-1.3.1 Students will add, subtract, multiply and divide whole numbers, fractions and decimals to solve real-world problems and apply order of operations (including positive whole number exponents) to simplify numerical expressions. DOK 2

MA-08-1.3.1 Students will add, subtract, multiply and divide rational numbers to solve real-world problems and apply order of operations (including positive whole number exponents) to simplify numerical expressions. DOK 2

MA-08-1.2.1 Students will estimate to solve real-world and mathematical problems with rational numbers, checking for reasonable and appropriate computational results. DOK 2

Mathematics Program of Studies

MA-6-NPO-U-2

Students will understand that meanings of and relationships among operations provide tools necessary to solve realistic problems encountered in everyday life.

MA-6-NPO-U-3
Students will understand that computing fluently and making reasonable estimates with fractions, decimals and whole numbers increases the ability to solve realistic problems encountered in everyday life.

MA-6-NPO-S-E1
Students will estimate and mentally compute to solve real-world and/or mathematical problems with whole numbers, fractions, decimals and percents, checking for reasonable and appropriate computational results.

MA-6-NPO-S-E2
Students will estimate large and small quantities of objects.

MA-6-M-U-2
Students will understand that measurable attributes of objects and the units, systems and processes of measurement are
powerful tools for making sense of the world around them.

MA-7-NPO-U-3
Students will understand that computing fluently and making reasonable estimates with fractions, decimals and whole numbers increases the ability to solve realistic problems encountered in everyday life.

MA-7-NPO-S-E1
Students will estimate and mentally compute to solve real-world and/or mathematical problems with fractions, decimals, percents and integers, checking for reasonable and appropriate computational results.

MA-7-NPO-S-E2
Students will estimate large and small quantities of objects.

MA-8-NPO-U-3
Students will understand that computing fluently and making reasonable estimates with fractions, decimals, percents and integers increases the ability to solve realistic problems encountered in everyday life.

Extension Math Content
MA-06-1.3.1 Students will add, subtract, multiply and divide whole numbers, fractions and decimals to solve real-world problems and apply order of operations to simplify numerical expressions. DOK 2

MA-07-1.3.1 Students will add, subtract, multiply and divide whole numbers, fractions and decimals to solve real-world problems and apply order of

operations (including positive whole number exponents) to simplify numerical expressions. DOK 2

MA-08-1.3.1 Students will add, subtract, multiply and divide rational numbers to solve real-world problems and apply order of operations (including positive whole number exponents) to simplify numerical expressions. DOK 2

Science Core Content

SC-06-4.7.1 Students will describe the consequences of change in one or more abiotic factors on a population within an ecosystem.

The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition). DOK 2

SC-07-4.7.1

Students will compare abiotic and biotic factors in an ecosystem in order to explain consequences of change in one or more factors.

SC-08-4.7.2

Students will:

- explain the interactions of the components of the Earth system (e.g., solid Earth, oceans, atmosphere, living organisms);
- propose solutions to detrimental interactions.

Interactions among the solid Earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing Earth system. DOK 3

Science Program of Studies

SC-6-I-S-1

Students will describe and explore the biotic and abiotic factors that affect change in ecosystems

SC-6-I-U-1

Students will be understand that ecosystems are more than just the organisms they contain:

a) geography, weather, climate and geologic factors also influence the interactions within an ecosystem.

SC-6-I-U-3

Students will understand that science can sometimes be used to inform ethical decisions by identifying the likely consequences of an action, but cannot be used to establish if taking that action would be right or wrong.

SC-6-I-S-4

Students will differentiate the usefulness of scientific research to predict the Possible consequences of decisions about environmental issues from its

limitations in making ethical/moral decisions about those issues.

SC-7-I-S-4
Students will research and discuss environmental impacts of actions (human or non-human) which necessitate choosing between undesirable alternatives (e.g., losing crops to insects vs.applying toxic pesticides).

SC-8-I-U-4
Students will understand that sometimes decisions have unintended consequences no matter
how thoughtfully they were made, and may actually create new problems and needs.

SC-8-I-S-4
Students will evaluate the risks and benefits of human actions affecting the environment and identify which populations will be harmed or helped. Use a variety of data/ sources to support or defend a position related to a proposed action, both orally and in writing. Analyze the validity of other arguments.

SC-8-I-S-5
Students will identify examples of human actions that have had unintended Environmental consequences (e.g., DDT weakening egg shells, lead-based paint, asbestos insulation)

Middle School Social Studies

SS-8-GC-U-5 **Students will understand that as members of a democratic society, all citizens of the United States have certain rights and responsibilities, including civic participation.**	**SS-8-GC-S-4** **Students will explain pros and cons of how citizen responsibilities (e.g., participate in community activities, vote in elections) and duties (e.g., obey the law, pay taxes, serve on a jury, register for the military) impact the U.S. government's ability to function as a democracy** **SS-8-GC-S-5** **Students will analyze information from a variety of print and non-print sources (e.g., books, documents, articles, interviews, Internet) to research answers to questions and explore issues**	*SS-08-1.3.1* *Students will explain and give examples of how significant United States documents (Declaration of Independence, Constitution, Bill of Rights) established democratic principles and guaranteed certain rights for all citizens.* *DOK 2* *SS-08-1.3.2* *Students will explain and give examples of how, in order for the U.S. government to function as a democracy, citizens must assume responsibilities (e.g., participating in community activities, voting in elections) and duties (e.g., obeying the law, paying taxes, serving on a jury, registering for the military)* *DOK 2*

Other Social Studies Core Content

SS-06-4.4.3 Students will explain how the natural resources of a place or region impact its political, social and economic development in the present day.

SS-08-4.4.3 Students will explain how the natural resources of a place or region impact its political, social and economic development in the United States prior to Reconstruction.

SS-08-4.2.1
Students will describe how regions in the U.S. prior to Reconstruction were made distinctive by human characteristics (e.g., dams, roads, urban centers) and physical characteristics (e.g., mountains, bodies of water) that created advantages and disadvantages for human activities (e.g., exploration, migration, trade, settlement). DOK 2

SS-08-4.2.2
Students will describe how places and regions in United States history prior to Reconstruction changed over time as technologies, resources and knowledge became available. DOK 2

Other Social Studies Program of Studies
SS-6-G-S-3
Students will investigate interactions among human activities and the physical environment in the present day.

SS-6-G-S-2
Students will investigate regions of the Earth's surface using information from print and non-print sources (e.g., books, films, magazines, Internet, geographic tools):
a) explain relationships between and among physical characteristics (e.g., mountains, bodies of water, valleys) of present day regions and how they are made distinctive by human characteristics (e.g., dams, roads, urban centers); describe advantages and disadvantages for human activities (e.g., exploration, migration, trade, settlement) that resulted

SS-6-G-S-3
Students will investigate interactions among human activities and the physical environment in the present day:
a) explain cause and effect relationships between the natural resources of a place or region and it's a) political, social, and economic development

SS-7-G-S –2
Students will investigate regions of the Earth's surface in world civilizations prior to 1500 A.D. using information from print and non-print sources (e.g., books, films, magazines, Internet, geographic tools):
a) explain relationships between and among physical characteristics of regions during the time of world civilizations prior to 1500 A.D., and explain how

regions were made distinctive (e.g., dams, irrigation, roads) by human characteristics; describe advantages and disadvantages for human activities (e.g., exploration, migration, trade, settlement) that resulted

SS-7-G-S –3
Students will investigate interactions among human activities and the physical environment

SS-8-G-S-3
Students will investigate interactions among human activities and the physical environment in the United States prior to Reconstruction.

SS-8-G-U-4
Students will understand that people depended on, adapted to, or modified the environment to meet basic needs. Human actions modified the physical environment and in turn, the physical environment limited or promoted human activities in the United States prior to Reconstruction.

SS-8-G-S-3
Students will investigate interactions among human activities and the physical environment in the United States prior to Reconstruction:

a) explain how people used technology to modify the physical environment to meet their needs

b) describe how the physical environment and different viewpoints promoted or restricted human activities (e.g., exploration, migration, trade, settlement, development) and land use.

Practical Living

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
VS-6-CD-U-4 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-6-CD-S-4** Students will evaluate ways consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by: **a)** using resources from home, school, and community that provide accurate and relevant health information **b)** describing the influence of environmental factors that positively and negatively affect health **c)** researching and describing services provided by environmental agencies	**PL-06-3.1.4** **Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy).** **DOK 2**

	(e.g., Soil Conversation, Environmental Protection Agency, KY Department of Natural Resources) **d)** investigating conservation issues related to consumption and waste management practices	

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
VS-7-CD-U-4 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-7-CD-S-4** Students will evaluate ways consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by: **a)** describing the influence of environmental factors that positively and negatively affect health **b)** researching local and state environmental issues that address consumption for conservation and waste management practices	**PL-07-3.1.4** **Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy).** **DOK 2**

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
VS-8-CD-U-5 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-8-CD-S-4** Students will evaluate ways consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by: **a)** describing the influence of environmental factors that positively and negatively affect health **b)** researching local and state environmental issues that address consumption for conservation and waste management practices	**PL-08-3.1.4** **Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy).** **DOK 2**

High School

Mathematics Core Content

MA-HS-2.2.1 Students will continue to apply to both real-world and mathematical problems
U.S. customary and metric systems of measurement.

Mathematics Program of Studies

MA-HS-M-S-SM2
Students will apply to both real world and mathematical situations US Customary and metric systems of measurement.

Extension Math Content

MA-HS-1.3.1 Students will solve real-world and mathematical problems to specified accuracy levels by simplifying expressions with real numbers involving addition, subtraction, multiplication, division, absolute value, integer exponents, roots (square, cube) and factorials.

MA-HS-2.2.1 Students will continue to apply to both real-world and mathematical problems
U.S. customary and metric systems of measurement.

MA-HS-4.3.2 Students will design simple experiments or investigations to collect data to answer questions of interest.

Science Core Content

SC-HS-4.7.2 Students will:

- evaluate proposed solutions from multiple perspectives to environmental problems caused by human interaction;

- justify positions using evidence/data. Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected. DOK 3

SC-HS-4.7.3 Students will: predict the consequences of changes to any component (atmosphere, solid Earth, oceans, living things) of the Earth System; propose justifiable solutions to global problems. Interactions among the solid Earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing Earth system. DOK 3

Science Program of Studies
SC-H-I-U-1
Students will understand that human beings are part of the Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.

SC-H-I-S-1
Students will explore ways to eradicate or lessen environmental problems caused by human interaction (e.g., examine programs for habitat restoration or wildlife protection, automotive/industrial emissions standards)

SC-H-I-S-5
Students will analyze examples of environmental changes resulting from the introduction, removal, or reintroductions of indigenous or non-indigenous species to an ecosystem. Use information to predict future impacts of similar changes in other ecosystems

SC-H-I-S-7
Students will explore the causes, consequences and possible solutions to persistent, contemporary and emerging global issues relating to environmental quality.

SC-H-I-S-3
Students will analyze and describe the effects of events (e.g., fires, hurricanes, deforestation, mining, population growth and municipal development) on environments from a variety of perspectives. Use data to propose ways of lessening impacts perceived as negative.

High School

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SC-H-I-U-4 Students will understand that every ecosystem contains natural checks and balances, both biotic and abiotic, that serve to limit the size and range of the populations contained within it.	SC-H-I-S-2 Students will investigate changes in ecosystems and propose potential solutions to problems by documenting and communicating solutions to others through multi-media presentations	**SC-HS-4.7.5** **Students will:** • **predict the consequences of changes in resources to a population;** • **select or defend solutions to real-world problems of population control.**

Practical Living

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**

VS-H-CD-U-6 Students will understand that consumer actions influence the use of resources and the impact they have on the environment.	**VS-H-CD-S-6** Students will evaluate consumer actions (e.g., reuse, reduce, recycle, choosing renewable energy sources, using biodegradable packaging materials, composting) and analyze how these actions impact the environment (e.g., conserving resources, reducing water, air, and land pollution, reducing solid waste, conserving energy, greenhouse effect, slowing global warming) by: **a)** describing the influence of environmental factors that positively and negatively affect health **b)** researching local, state, national and international environmental issues that address consumption for conservation and waste management practices	**PL-HS-3.1.4** **Students will compare consumer actions (reuse, reduce, recycle, choosing renewable energy sources, using biodegradable packaging materials, composting) and analyze how these actions impact the environment (e.g., conserving resources; reducing water, air, and land pollution; reducing solid waste; conserving energy).** **DOK 3**

Activity Title: Sum of the Parts

Source: *Project WET*, p. 267

Related Stormwater Activities from *Project WET*:

- **Just Passing Through, p. 166**
- **A-maze-ing Water, p. 219**
- **Rainy Day Hike, p. 186**

Core Content

Elementary

Science

SC-04-4.7.2
Students will:
• describe human interactions in the environment where they live;
• classify the interactions as beneficial or harmful to the environment using data/evidence to support conclusions.

All organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms; other changes are beneficial (e.g., dams benefit some aquatic organisms but are detrimental to others). By evaluating the consequences of change using cause and effect relationships, solutions to real life situations/dilemmas can be proposed.
DOK 3

SC-05-2.3.2
Students will explain interactions of water with Earth materials and results of those interactions (e.g., dissolving minerals, moving minerals and gases). Water dissolves minerals and gases and may carry them to the oceans.
DOK 3

Social Studies

SS-EP-3.4.3
Students will define interdependence and give examples of how people in our communities, states, nation and world depend on each other for goods and services.

SS-EP-4.1.1
Students will use geographic tools (e.g., maps, globes, mental maps, charts, graphs) to locate and describe familiar places at home, school and the community.

SS-EP-4.1.3
Students will describe how different factors (e.g. rivers, mountains) influence where human activities are located in the community.

SS-04-1.1.2
Students will explain how state governments function (by making, enacting and enforcing laws) to protect the rights and property of citizens.
DOK 2

SS-04-3.4.3
Students will define interdependence and give examples of how people in our communities, states, nation and world depend on each other for goods and services.

SS-04-4.1.1
Students will use geographic tools (e.g., maps, charts, graphs) to identify and describe natural resources and other physical characteristics (e.g., major landforms, major bodies of water, weather, climate, roads, bridges) in regions of Kentucky and the United States.
DOK 2

SS-04-4.1.3
Students will describe how different factors (e.g. rivers, mountains) influence where human activities were/are located in Kentucky.

SS-05-1.1.2
Students will explain and give examples of how democratic governments function (by making, enacting and enforcing laws) to promote the “common good” (e.g., public smoking ban, speed limits, seat belt requirements).
DOK 3

SS-05-2.3.2
Students will give examples of conflicts between individuals or groups and describe appropriate conflict resolution strategies (e.g., compromise, cooperation, communication).
DOK 2

SS-05-3.4.3
Students will define interdependence and give examples of how people in our communities, states, nation and world depend on each other for goods and services.

SS-05-4.1.3
Students will describe how different factors (e.g. rivers, mountains) influence where human activities were/are located in the United States.

SS-05-4.1.4
Students explain how factors in one location can impact other locations (e.g., natural disasters, building dams).

SS-05-4.4.3
Students will describe how individuals/groups may have different perspectives about the use of land (e.g., farming, industrial, residential, recreational).

Middle School

Science

SC-08-4.7.1
Students will describe the interrelationships and interdependencies within an ecosystem and predict the effects of change on one or more components within an ecosystem.

Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.
DOK 3

SC-08-4.7.2
Students will:
• explain the interactions of the components of the Earth system (e.g., solid Earth, oceans, atmosphere, living organisms);
• propose solutions to detrimental interactions.

Interactions among the solid Earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing Earth system.
DOK3

Social Studies

SS-06-2.3.1
Students will explain how conflict and competition (e.g., political, economic, religious, ethnic) occur among individuals and groups in the present day.
DOK

SS-06-2.3.2
Students will explain how compromise and cooperation are possible choices to resolve conflict among individuals and groups in the present day.
DOK 2

SS-06-4.1.2
Students will describe how different factors (e.g., rivers, mountains, plains) affect where human activities are located in the present day.

SS-06-4.2.1
Students will describe how regions in the present day are made distinctive by human characteristics (e.g., dams, roads, urban centers) and physical characteristics (e.g., mountains, bodies of water, valleys) that create advantages and disadvantages for human activities (e.g., exploration, migration, trade, settlement, development).
DOK 2

SS-06-4.3.1
Students will describe patterns of human settlement in the present day and explain how these patterns are influenced by human needs.
DOK 2

SS-06-4.4.4
Students will explain how individual and group perspectives impact the use of natural resources (e.g., urban development, recycling) in the present day.

High School

Science

SC-HS-4.7.2
Students will:
• evaluate proposed solutions from multiple perspectives to environmental problems caused by human interaction;
• justify positions using evidence/data.
Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.
DOK 3

SC-HS-4.7.1
Students will:
- analyze relationships and interactions among organisms in ecosystems;
- predict the effects on other organisms of changes to one or more components of the ecosystem.

Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.
DOK 3

Program of Studies

Elementary

Science

SC-4-I-S-3
Students will observe, document and describe human interactions that impact the local environment.

SC-4-I-S-4
Students will describe and provide examples of how beneficial and harmful are relative terms.

SC-4-I-S-5
Students will evaluate the consequences of changes caused by humans or other organisms, and propose solutions to real life situations/dilemmas.

SC-5-EU-S-4
Students will explore the concept of watersheds and identify factors that impact them, including results of interactions of water with earth materials (e.g., dissolving minerals, moving minerals and gases).

Social Studies

SS-4-G-S-1
Students will demonstrate an understanding of patterns on the Earth's surface, using a variety of geographic tools (e.g., maps, globes, charts, graphs):

d) explain and give examples of how physical factors (e.g., rivers, mountains) impacted human activities during the early settlement of Kentucky

SS-5-GC-S-1
Students will demonstrate an understanding of government, using information from print and non-print sources (e.g., documents, informational passages/texts, interviews, digital and environmental):

b) explain how democratic governments work to promote the "common good" (e.g., making, enacting, enforcing laws that protect rights and property of all citizens)

SS-5-CS-S-4
Students will describe causes of conflicts between individuals and/or groups today and give examples of how to resolve them peacefully.

Middle School

Science

SC-8-I-S-2
Students will analyze ecosystems to identify patterns of cooperation that enhance stability.

Social Studies

SS-6-CS-S-4
Students will describe conflicts between individuals or groups and explain how compromise and cooperation are possible choices to resolve conflict among individuals and groups in the United States and across regions of the world in the present day.

SS-6-G-S-3
Students will investigate interactions among human activities and the physical environment in the present day:

a) explain cause and effect relationships between the natural resources of a place or region and its political, social, and economic development

High School

Science

SC-H-I-S-1
Students will explore ways to eradicate or lessen environmental problems caused by human interaction (e.g., examine programs for habitat restoration or wildlife protection, automotive/industrial emissions standards).

Turbidity or Not Turbidity?

That Is The Question!!!!

What Is Turbidity?

- Turbidity, is an optical property of water based on the amount of light reflected by suspended particles. Measuring turbidity will give an idea of the volume of matter present in a body of water at a particular time which is an important factor in assessing water quality.

What Influences Turbidity?

- Erosion increases the amount of sediment (soil particles) in water. This increased sediment influences turbidity. Thus, very turbid water appears murky or cloudy. All natural waters are somewhat turbid, even if only at microscopic levels.

Suspended and Colloidal Matter

- Suspended and Colloidal matter are microscopic particles that remain suspended in water and diffract light. It can be anything that is suspended in the water column ranging from:
- sand
- silt,
- clay,
- plankton,
- industrial wastes
- sewage
- lead
- asbestos to bacteria and viruses.
- Some suspended matter occurs naturally and some is produced by human activities.

How are River Organisms Effected?




Aquatic organisms are particularly susceptible to the effects of increased sediments and turbidity. Many fish need clear water to spot their prey Macroinvertebrates, fish eggs, and larvae require oxygen-rich water circulating through clean gravel beds to survive. Sediments can smother fish eggs and aquatic insects and suffocate clams and oysters.

Effects of Organisms cont….

- Cloudy water absorbs more of the sun's energy than clear water. This causes high turbidity which leads to higher river temperatures.
- This can severely affect aquatic organisms, many of which are adapted to survive within narrow temperature ranges.



Turbidity & Sediment Effects People

- According to the Environmental Protection Agency (EPA), sediment is one of the first things filtered out of source water at a drinking water treatment plant and is one of the few water quality contaminants that must be monitored daily.
- Suspended solids can harbor harmful bacteria and can also decrease the effectiveness of chlorination used to help remove those harmful bacteria.

Effects on People cont….

- There are economic impacts as well. The production of the following everyday products requires that water be free of sediment and other suspended solids
- Paper
- Food
- Computer chips
- Other assorted electronics

Most Common Source of Suspended Matter

- Sediment washed by erosion and runoff into a body of water.
- Sediment is the most common form of nonpoint source pollution.
- Human-caused erosion stems mainly from activities like road building, construction, agriculture, logging, and other endeavors that remove or disturb vegetation.
- Natural erosion and the resulting turbidity is a common occurrence in some watersheds.

Is High Turbidity A Good Thing?

- Many rivers carry high sediment loads due to the nature of the rock and soil layers that they pass through.
- Limestone and Sandstone are examples of types of rock material that have a high erosion capacity.
- Evidence of this is high turbidity and muddy flows. The picture of the Missouri River (also called "Big Muddy") is an example of high turbidity.

Some Organisms Like Muddy Water!!!

- Previously we learned that aquatic organisms were sensitive to high turbidity water
- Although this is true, there are some organisms that actually adapt to the muddy water and thrive.
- Paddlefish, found in the upper Missouri river, have long, sensitive snouts that allow them to probe for food in the dark, murky water.

Organisms cont….

- Channel catfish have barbells on their snouts that serve the same function.

So What Is The Solution?

If erosion and runoff are the largest contributors to sediments in our waterways then slowing runoff and minimizing erosion is crucial to improving water.

Sometimes human-caused erosion can be managed to reduce the turbidity of waterways.

Turbidity or Not Turbidity
KY Core Content and Program of Studies

Resource: Healthy Water Healthy People

Program of Studies and Core Content

SCIENCE

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SC-4-I-U-3 Students will understand that people impact their environment in both beneficial and harmful ways. Some of these impacts can be predicted, while others cannot.	SC-4-I-S-3 Students will observe, document and describe human interactions that impact the local environment SC-4-I-S-5 Students will evaluate the consequences of changes caused by humans or other organisms, and propose solutions to real life situations/dilemmas SC-4-I-S-6 Students will use evidence (obtained through investigative and/or non investigative research) to support or defend positions on real world environmental problems.	SC-04-4.7.2 Students will: • **describe human interactions in the environment where they live;** • **classify the interactions as beneficial or harmful to the environment using data/evidence to support conclusions.** **All organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms; other changes are beneficial (e.g., dams benefit some aquatic organisms but are detrimental to others). By evaluating the consequences of change using cause and effect relationships, solutions to real life situations/dilemmas can be proposed.** DOK 3

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SC-6-I-U-1 **Students will be understand that ecosystems are more than just the organisms they contain: geography, weather, climate and geologic factors also influence the interactions within an ecosystem.**	**SC-6-I-S-1** **Students will describe and explore the biotic and abiotic factors that affect change in ecosystems** **SC-6-I-S-2** **Students will document and describe consequences of change in one or more abiotic factors on**	**SC-06-4.7.1** **Students will describe the consequences of change in one or more abiotic factors on a population within an ecosystem.**

	a population within an ecosystem **SC-6-I-S-3** **Students will investigate how communities are interconnected, how they interact with different Earth systems, and represent these global connections/interactions in a variety of ways (e.g. writing, models, multi-media, claymation)**	

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SC-7-I-U-2 **Students will understand that changes within an ecosystem may be caused by the interactions of many factors, both biotic and abiotic. Seemingly small changes can have significant consequences as their effects ripple through a community.**	**SC-7-I-S-1** **Students will research and investigate environmental situations where small changes may have large impacts in both living and non-living components of systems (e.g., introduction of zebra mussels into the Kentucky river, planting kudzu to stabilize hillsides)** **SC-7-I-S-5** **Students will design and conduct investigations of changes to abiotic and biotic factors in ecosystems, document and communicate observations, procedures, results and conclusions**	**SC-07-4.7.1** **Students will compare abiotic and biotic factors in an ecosystem in order to explain consequences of change in one or more factors.**
SC-7-I-U-3 **Students will understand that not all actions/decisions have the possibility of a desirable outcome. Sometimes a compromise requires accepting one unwanted outcome to avoid a different unwanted outcome.**	**SC-7-I-S-4** **Students will research and discuss environmental impacts of actions (human or non-human) which necessitate choosing between undesirable alternatives (e.g., losing crops to insects vs. applying toxic pesticides)**	

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
	SC-8-I-S-1 **Students will predict the effects of change on one or more components within an ecosystem by analyzing a variety of data.**	**SC-08-4.7.1** **Students will describe the interrelationships and interdependencies within an ecosystem and predict the effects**

		of change on one or more components within an ecosystem.
	SC-8-I-S-4 **Students will evaluate the risks and benefits of human actions affecting the environment and identify which populations will be harmed or helped. Use a variety of data/ sources to support or defend a position related to a proposed action, both orally and in writing. Analyze the validity of other arguments**	**SC-08-4.7.2** **Students will:** • **explain the interactions of the components of the Earth system (e.g., solid Earth, oceans, atmosphere, living organisms);** • **propose solutions to detrimental interactions.** Interactions among the solid Earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing Earth system. DOK 3

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SC-H-I-U-1 **Students will understand that human beings are part of the Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.** **SC-H-I-U-2** **Students will understand that unique among organisms, humans have the capability to impact other species on a global scale both directly (e.g. selective breeding, genetic engineering, foreign species introductions) and indirectly (e.g. habitat crowding, pollution, climate change).**	**SC-H-I-S-1** **Students will explore ways to eradicate or lessen environmental problems caused by human interaction (e.g., examine programs for habitat restoration or wildlife protection, automotive/industrial emissions standards).** **SC-H-I-S-7** **Students will explore the causes, consequences and possible solutions to persistent, contemporary and emerging global issues relating to environmental quality.**	**SC-HS-4.7.2** **Students will:** • **evaluate proposed solutions from multiple perspectives to environmental problems caused by human interaction;** • **justify positions using evidence/data.** **Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.** **DOK 3**

	SC-H-I-S-3 **Students will analyze and describe the effects of events (e.g., fires, hurricanes, deforestation, mining, population growth and municipal development) on environments from a variety of perspectives. Use data to propose ways of lessening impacts perceived as negative**	**SC-HS-4.7.3** **Students will:** • **predict the consequences of changes to any component (atmosphere, solid Earth, oceans, living things) of the Earth System;** • **propose justifiable solutions to global problems.** Interactions among the solid Earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing Earth system. DOK 3

Other Science Program of Studies

SC-P-I-S-1
Students will identify the characteristics of an ecosystem.

SC-5-I-S-4
Students will analyze, create and describe visual representations of ecosystems and the interactions occurring within them. Compare and critique pre-existing and student-constructed representations for accuracy, identifying strengths and limitations, insisting on the use of evidence to support decisions

SOCIAL STUDIES

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
SS-P-GC-U-2 Students will understand that citizens of local communities have certain rights and responsibilities in a democratic society.	**SS-P-GC-S-2** **Students will explore personal rights and responsibilities:** **a)** explain, demonstrate, give examples of ways to show good citizenship at school and in the community (e.g., recycling, picking up trash) **b) describe the importance of civic participation and locate examples (e.g., donating canned food to a class food drive) in current events/news**	*SS-EP-1.3.1* *Students will define basic democratic ideas (e.g., liberty, justice, equality, rights, responsibility) and explain why they are important today.* **SS-EP-1.3.2** **Students will identify and give examples of good citizenship at home, at school and in the community (e.g., helping with chores, obeying rules, participating in community service projects such as recycling, conserving natural resources, donating food/supplies) and explain why civic engagement in the community is important.** **DOK 2**

SS-4-GC-U-3 **Students will understand that all citizens of Kentucky have rights and responsibilities as members of a democratic society, including civic participation.**	**SS-4-GC-S-2** **Students will explore rights and responsibilities:** **a)** describe, give examples, and compare rights and responsibilities **b) describe the benefits of citizenship and find examples of citizenship in current events/news media**	**SS-04-1.3.1** **Students will identify the basic principles of democracy (e.g., justice, equality, responsibility, freedom) found in Kentucky's Constitution and explain why they are important to citizens today.** **DOK 2** **SS-04-1.3.2** **Students will describe specific rights and responsibilities individuals have as citizens of Kentucky (e.g., voting in statewide elections, participating in state service projects, obeying state laws) and explain why civic engagement is necessary to preserve a democratic society.** **DOK 2**
SS-5-GC-U-5 **Students will understand that as members of a democratic society, all citizens of the United States have certain rights and responsibilities, including civic participation.**	**SS-5-GC-S-4** **Students will investigate the rights and responsibilities of U.S. citizens:** **a)** describe and give examples of specific rights guaranteed to all U.S. citizens in the Bill of Rights (e.g., freedom of religion, freedom of speech, freedom of press) and explain why they are important today **b) describe some of the responsibilities U.S. citizens have in order for democratic governments to function effectively (e.g. voting, community service, paying taxes) and find examples of civic participation in current events/news (e.g., television, radio, articles, Internet)**	**SS-05-1.3.2** **Students will describe specific rights and responsibilities individuals have as citizens of the United States (e.g., voting in national elections) and explain why civic engagement is necessary to preserve a democratic society.** **DOK 3**
SS-8-GC-U-5 Students will understand that as members of a democratic society, all citizens of the United States have certain rights and responsibilities, including civic participation.	SS-8-GC-S-4 **Students will explain pros and cons of how citizen responsibilities (e.g., participate in community activities, vote in elections) and duties (e.g., obey the law, pay taxes, serve on a jury,**	**SS-08-1.3.1** **Students will explain and give examples of how significant United States documents (Declaration of Independence, Constitution, Bill of Rights) established democratic principles and guaranteed certain rights for all citizens.** **DOK 2**

	register for the military) impact the U.S. government's ability to function as a democracy SS-8-GC-S-5 **Students will analyze information From a variety of print and non-print Sources (e.g., books, documents, articles, interviews, Internet) to research answers to questions and explore issues**	**SS-08-1.3.2** Students will explain and give examples of how, in order for the U.S. government to function as a democracy, citizens must assume responsibilities (e.g., participating in community activities, voting in elections) and duties (e.g., obeying the law, paying taxes, serving on a jury, registering for the military) DOK 2

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SS-H-GC-U-4 Students will understand that all citizens of the United States have certain rights and responsibilities as members of a democratic society.	**SS-H-GC-S-1** Students will demonstrate an understanding (e.g., illustrate, write, model, present, debate) of the nature of government: **a)** examine ways that democratic governments do or do not preserve and protect the rights and liberties of their constituents (e.g., U.N. Charter, Declaration of the Rights of Man, U.N. Declaration of Human Rights, U.S. Constitution) **b)** **SS-H-GC-S-3** Students will investigate the rights of individuals (e.g., Freedom of Information Act, free speech, civic responsibilities in solving global issues) to explain how those rights can sometimes be in conflict with the responsibility of the government to protect the "common good" (e.g., homeland security issues, environmental regulations, censorship, search and seizure), the rights of others (e.g., slander, libel), and civic responsibilities (e.g., personal belief/responsibility versus civic responsibility) **SS-H-GC-S-4** Students will evaluate the impact citizens have on the functioning of a democratic government by assuming responsibilities (e.g., seeking and assuming leadership positions, voting) and duties (e.g.,	**SS-HS-1.3.1** **Students will explain and give examples how the rights of one individual (e.g., smoking in public places, free speech) may, at times, be in conflict (e.g., slander, libel) with the rights of another.** **DOK 2** *SS-HS-1.3.2* *Students will explain how the rights of an individual (e.g., Freedom of information Act, privacy) may, at times, be in conflict with the responsibility of the government to protect the "common good" (e.g., homeland security issues, environmental regulations, censorship, search and seizure).* **DOK 2** *SS-HS-1.3.3* *Students will evaluate the impact citizens have on the functioning of a democratic government by assuming responsibilities (e.g., seeking and assuming leadership positions, voting) and duties (e.g., serving as jurors, paying taxes, complying with local, state and federal laws, serving in the armed forces).*

	serving as jurors, paying taxes, complying with local, state and federal laws, serving in the armed forces) **SS-H-GC-S-5** Students will analyze and synthesize a variety of information from print and non-print sources (e.g., books, documents, articles, interviews, Internet, film, media) to research issues, perspectives and solutions to problems	

Other Social Studies Program of Studies

SS-6-G-S-3

Students will investigate interactions among human activities and the physical environment in the present day.

SS-6-G-S-2

Students will investigate regions of the Earth's surface using information from print and non-print sources (e.g., books, films, magazines, Internet, geographic tools):

- **a)** explain relationships between and among physical characteristics (e.g., mountains, bodies of water, valleys) of present day regions and how they are made distinctive by human characteristics (e.g., dams, roads, urban centers); describe advantages and disadvantages for human activities (e.g., exploration, migration, trade, settlement) that resulted

SS-6-G-S-3

Students will investigate interactions among human activities and the physical environment in the present day:

- **a) explain cause and effect relationships between the natural resources of a place or region and it's a) political, social, and economic development**

SS-7-G-S –3

Students will investigate interactions among human activities and the physical environment

SS-8-G-S-3

Students will investigate interactions among human activities and the physical environment in the United States prior to Reconstruction.

SS-8-G-U-4

Students will understand that people depended on, adapted to, or modified the environment to meet basic needs. Human actions modified the physical environment and in turn, the physical environment limited or promoted human activities in the United States prior to Reconstruction.

SS-8-G-S-3

Students will investigate interactions among human activities and the physical

environment in the United States prior to Reconstruction:

- **a)** explain how people used technology to modify the physical environment to meet their needs
- **b) describe how the physical environment and different viewpoints promoted or restricted human activities (e.g., exploration, migration, trade, settlement, development) and land use.**

Activity Title: A Fishy Tale

Source: *Kentucky's Wonderful Commonwealth of Water*, p. 65

Related Stormwater Activities from KWCW:

- **Filtering Away Pollutants, p. 69**
- **The Runoff Water Mystery, p. 99**
- **We All Live in a Watershed, p. 105**
- **Can Being Clean Make You Sick?, p. 289**

Core Content

Elementary

Science

SC-EP-3.4.1
Students will explain the basic needs of organisms.

Organisms have basic needs. For example, animals need air, water and food; plants need air, water, nutrients and light. Organisms can survive only in environments in which their needs can be met.
DOK 2

SC-EP-4.7.1
Students will describe the cause and effect relationships existing between organisms and their environments.

The world has many different environments. Organisms require an environment in which their needs can be met. When the environment changes some plants and animals survive and reproduce and others die or move to new locations.
DOK 2

Social Studies

SS-EP-4.4.1
Students will describe ways people adapt to/modify the physical environment to meet their basic needs (food, shelter, and clothing).
DOK 1

Program of Studies

Elementary

Science

SC-P-UD-S-1
Students will describe the basic needs of organisms and explain how these survival needs can be met only in certain environments.

SC-P-I-S-4
Students will describe how changes in an environment might affect plants' and animals' ability to survive.

Social Studies

SS-P-G-S-3
Students will compare ways people and animals modify the physical environment to meet their basic needs (e.g., clearing land to build homes versus building nests and burrows as shelters).

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

A Fishy Tale

Adapted from "Freddy the Fish", found in *Instructional Models For Use With Enviroscapes*, KEEC, NKEEA, pages 1-3

Standards

Science: SC-E-3.1.2, Students will understand that organisms have basic needs (e.g., air, water, nutrients, light) and can only survive when these needs are met.
Science: SC-E-3.3.3, Students will understand that all organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms, other changes are beneficial.

The next standard is introduced in this activity.
Social Studies: SS-E-4.4.2, Students will recognize that people depend on, adapt to, or modify the environment to meet basic needs.

Activity Description

Students will be introduced to point and nonpoint sources of pollution as they take a trip with a pretend fish in a pretend river during this simulation activity.

Materials

- Large fishbowl or aquarium
- Sponge cut in shape of fish
- Plant food /colored drink mix
- Punched out paper dots
- Yellow and red food coloring
- Grass clippings or decaying plants
- 7 small paper cups
- String
- Pencil or stick
- Liquid detergent
- A weight or fishing sinker
- Soil
- Water
- Salt
- Cooking oil

Length of Lesson

Approximately 30 minutes

Vocabulary Words

Point Source Pollution— pollution that can be traced to a single point source such as a pipe or culvert (e.g., industrial or wastewater treatment plant)
Nonpoint Source Pollution—pollution that cannot be traced to a single point (e.g., outlet or pipe) because it comes from many individual sources or a widespread area (typically urban, rural and agricultural runoff).
Nutrients—food for living organisms. If more nutrients are applied to the land than the plants growing there can use, the excess can pollute water.

Essential Question

What is water and why is it important?

Guiding Questions

- What happened in this activity to change the fish's environment?
- In our community what might pollute water?
- What can we do to clean up the water before disposing of it?

Skills Used

Observe	Predict	Communicate	Listen
Analyze	Problem Solve	Connect	Discuss

A Fishy Tale, *continued*

Activity

Step 1: Gather the materials needed for this activity. Cut the sponge into the shape of a fish. Attach the weight to the bottom of the "fish" with the string. Suspend the fish in the fishbowl or aquarium by tying it to a pencil or stick suspended across the top of the container.

Step 2: Prepare "pollutants" for this activity by placing a small amount of soil in cup #1, colored drink mix or plant food for plant fertilizer in cup #2, grass clippings or decaying plants in cup #3, cooking oil in cup #4, salt in cup #5, paper dots in cup #6, and warm water with detergent in cup #7.

Step 3: Make a copy of the script (found on the next page) on tag board. Cut it apart for students to use during this activity.

Step 4: Assign ten students to read the script. As each scene is read, ask different students to pour the mentioned pollutant into "Buddy's river".

Step 5: Take the time during this activity to stop after each substance has been added to the river and discuss how Buddy feels. Encourage discussion about water pollution and its affect on plants and animals. Discuss with students possible point and nonpoint sources of pollution in your own area.

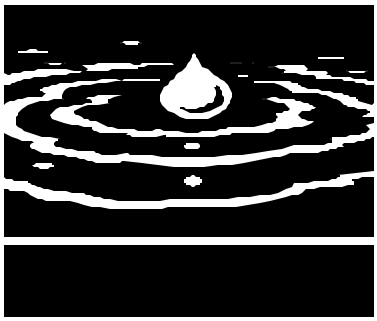
Step 6: At the end of the script, ask students what should be done with the container of polluted water. Help students gain in their understanding of why the water cannot be poured down the drain or dumped outside on the ground, since it could pollute fish or animals in local creeks or rivers.

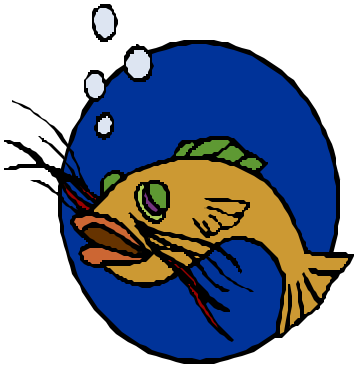
Step 7: Talk about how water is filtered both naturally and in water treatment facilities**.** Ask students to think about and discuss different types of filters they have seen used before.

NOTE: This discussion should automatically flow into the next activity in this unit, "Filtering Away Pollutants", so students can see that there are good solutions to water pollution..

Extension:

Borrow an Enviroscape tabletop model to show exactly how pollutants get into the water system. See Teacher Fact Sheets for where to borrow an enviroscape model near you.





Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

A Fishy Tale Script

1. Today we are going to imagine this container of water is a clean river flowing gently through the rolling hills of Kentucky. In this river lives a friendly little fish named Buddy. How do you think Buddy feels today as he is relaxing in his clean, beautiful river?

2. Buddy has lived in this part of the river with his family for his entire life. Today, though, he has decided that he is old enough for an adventure away from his mom and dad. Let's join Buddy as he begins his adventure.

3. Buddy's first part of his journey takes him into farm country. As he swims along, he passes a recently plowed riverbank. It begins to rain, and some of the soil from the riverbank erodes and washes into the river. ***(Pour soil into water.)*** How does Buddy feel?

4. Buddy swims close to a suburban neighborhood. Some fertilizer from the nearby lawns washed into the river a few months ago. ***(Pour plant food or colored drink mix into water.)*** This fertilizer made the plants in the river grow very dense. The river was unable to furnish these plants with all of the nutrients they needed, so they began to die and decay. ***(Pour grass clippings or decaying plants into water.)*** This decomposing process is using up some of Buddy's oxygen. How does Buddy feel?

5. Buddy swims under a bridge. Some cars traveling across the bridge are leaking oil. The rain is washing the oil into Buddy's river. ***(Pour cooking oil into the water.)*** How does Buddy feel?

6. Last week when the weather turned very cold one night, the highway department had to spread salt on the bridge to keep it from freezing. The rain is now washing the rest of the salt off the bridge and into the river. ***(Pour salt into the water.)*** How does Buddy feel?

7. Buddy is now swimming past a city park. A few of the picnickers did not throw their trash into the cans. Instead, the wind has started blowing it into the river. ***(Sprinkle in paper dots.)*** How does Buddy feel?

8. Buddy is leaving the city and swimming toward some factories located in the county industrial park. Laws have been passed to keep factories from dumping pollutants into the river, but these factories are ignoring the laws. ***(Pour warm soapy water into the water.)*** How does Buddy feel?

9. Buddy is passing the city's wastewater treatment plant and has discovered that some of the sewage from the plant is flowing into the river because the plant is not working properly. ***(Squirt 2 drops of yellow food coloring into water.)*** How does Buddy feel?

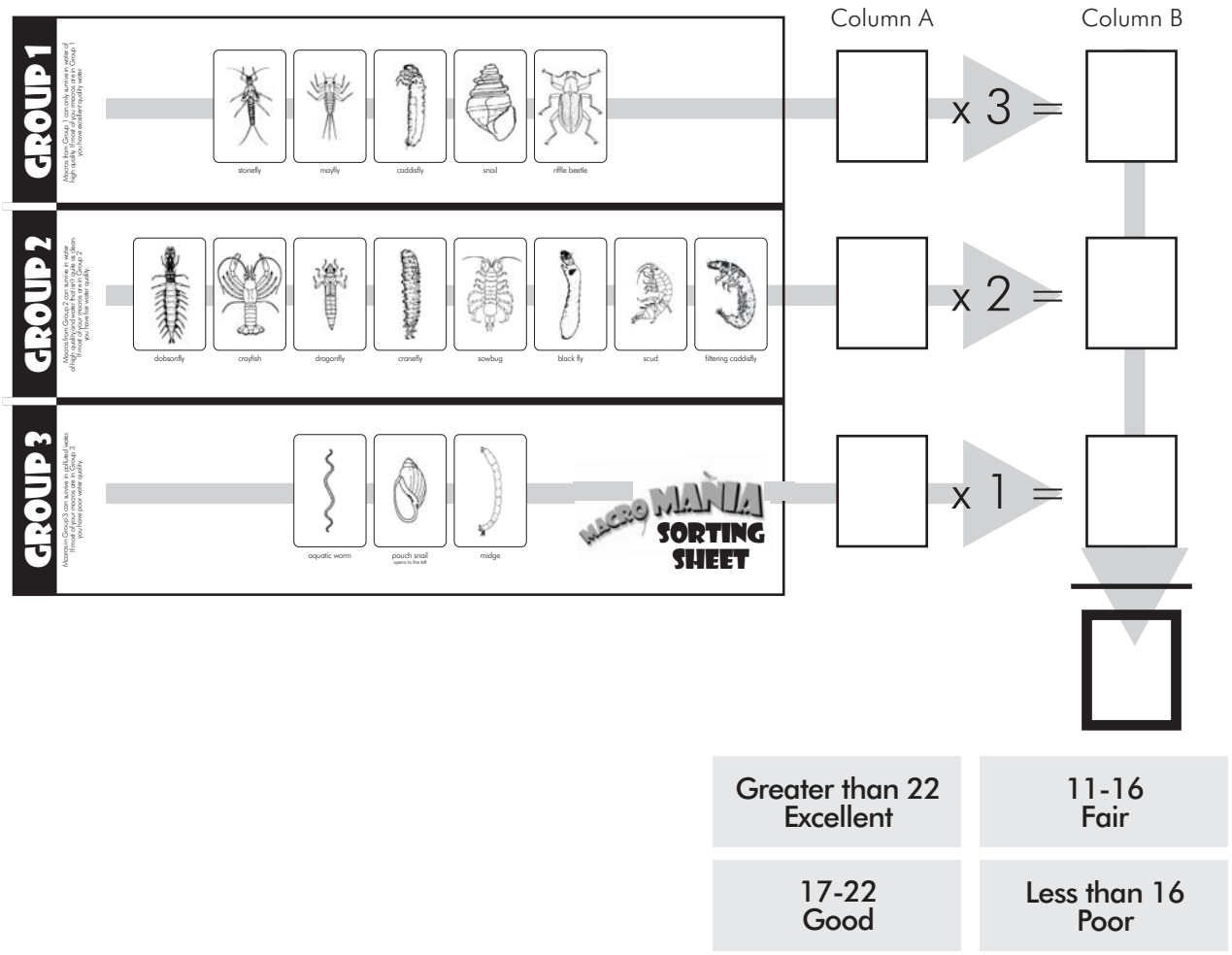
10. Finally, Buddy swims past a hazardous waste dump only to find the rusty barrels holding the harmful chemicals are leaking. The rain is washing these poisonous chemicals into the river. ***(Squirt one drop of red food coloring into water.)*** How does Buddy feel?

STREAM WATER QUALITY WORKSHEET

Use with Math Extension - Calculate Biotic Index of Stream Water Quality

Team Members _____ Date _____

Site (Color of card deck) _____ Land Use _____

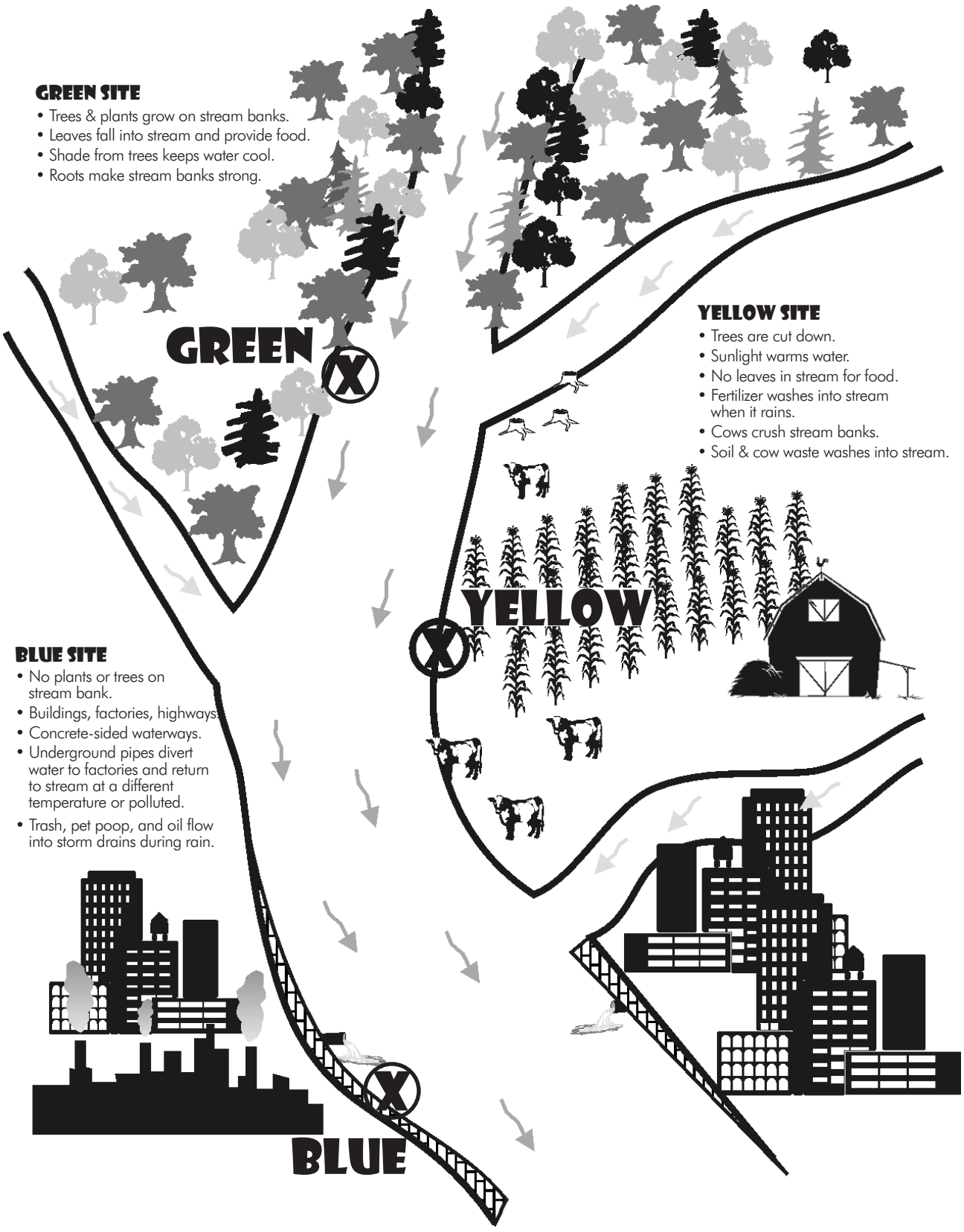


Greater than 22 Excellent	11-16 Fair
17-22 Good	Less than 16 Poor

1. Fill in the information at the top of the form.
2. Put an X on the mini sorting sheet above where there are cards on your sorting sheet.
3. Count the number of boxes with Xs in each row. Write the number in Column A.
4. Multiply the numbers in Column A by the factor. Write the answers in the boxes in Column B.
5. Add together the numbers in the boxes in Column B. Write the total in the box at the bottom of Column B.
6. Circle the range that contains the number in the box. What is the water quality at your site?

MACRO MANIA SITE MAP

Use with Basic Activity and Assessment Activity



Macro Mania
KY Core Content and Program of Studies

Resource: Lamotte, http://www.lamotte.com/pages/edu/5942.html and http://www.lamotte.com/pages/edu/macromap.html

Related Lesson
Macroinvetebrate Mayhem, Project WET

Program of Studies and Core Content

SCIENCE

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SC-P-I-U-1 Students will understand that the world has many different environments. Distinct environments support the lives of different types of organisms.	SC-P-I-S-1 Students will identify the characteristics of an ecosystem. SC-P-I-S-2 Students will observe, document and explain how organisms depend on their environments SC-P-I-S-3 Students will describe and explain how the environment can be affected by the organisms living there. SC-P-I-S-5 Students will ask questions that can be explored using a variety of appropriate print and non-print resources (e.g., why certain plants can not survive in a particular area; why some animals are endangered or extinct; why some areas are 'protected')	**SC-EP-4.7.1** **Students will describe the cause and effect relationships existing between organisms and their environments.** **The world has many different environments. Organisms require an environment in which their needs can be met. When the environment changes some plants and animals survive and reproduce and others die or move to new locations.** **DOK 2**
SC-P-I-U-2 Students will understand that when the environment changes, some plants and animals survive and reproduce, and others die or move to new locations.	SC-P-I-S-4 Students will describe how changes in an environment might affect plants' and animals' ability to survive SC-P-I-S-5 Students will ask questions that can be explored using a variety of appropriate print and non-print resources (e.g., why certain plants	**SC-EP-4.7.1** **Students will describe the cause and effect relationships existing between organisms and their environments.** **The world has many different environments. Organisms require an environment in which their needs can be met. When the environment changes some plants**

	can not survive in a particular area; why some animals are endangered or extinct; why some areas are 'protected')	**and animals survive and reproduce and others die or move to new locations.** **DOK 2**

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SC-4-I-U-3 **Students will understand that people impact their environment in both beneficial and harmful ways. Some of these impacts can be predicted, while others cannot.**	**SC-4-I-S-3** **Students will observe, document and describe human interactions that impact the local environment** **SC-4-I-S-5** **Students will evaluate the consequences of changes caused by humans or other organisms, and propose solutions to real life situations/dilemmas** **SC-4-I-S-6** **Students will use evidence (obtained through investigative and/or non investigative research) to support or defend positions on real world environmental problems.**	SC-04-4.7.2 Students will: • **describe human interactions in the environment where they live;** • **classify the interactions as beneficial or harmful to the environment using data/evidence to support conclusions.** **All organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms; other changes are beneficial (e.g., dams benefit some aquatic organisms but are detrimental to others). By evaluating the consequences of change using cause and effect relationships, solutions to real life situations/dilemmas can be proposed.** DOK 3

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
	SC-5-BC-S-3 Students will Investigate ways that organisms cope with fluctuations (e.g. temperature, precipitation, change in food sources) in their environments	*SC-05-3.5.2* *Students should understand that all organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.*
SC-5-BC-U-4 Students will understand that scientific investigations may take many different forms, including	SC-5-BC-S-5 Students will compare procedures used (e.g., experiments, investigative and non-investigative research,	

observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments. The question being investigated determines the form of the investigation used.	observations) to find information/collect data about the diversity of organisms that exist or have existed on Earth	
	SC-5-I-S-4 Students will analyze, create and describe visual representations of ecosystems and the interactions occurring within them. Compare and critique pre-existing and student-constructed representations for accuracy, identifying strengths and limitations, insisting on the use of evidence to support decisions	

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SC-6-BC-U-2 Students will understand that sensing and controlling internal processes in response to the external environment are essential for an organism's survival, regardless of how simple or complex it is.	SC-6-BC-S-2 Students will explain how various organisms sense (e.g. hunger, fatigue, temperature awareness) and control their internal environments (e.g. fat metabolism, adrenaline release, perspiration) and how this contributes to their survival	*SC-06-3.5.2* *Students will understand that regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required to survive. Maintaining a stable internal environment is essential for an organism's survival.*
SC-6-I-U-1 Students will be understand that ecosystems are more than just the organisms they contain: geography, weather, climate and geologic factors also influence the interactions within an ecosystem. SC-6-I-U-2 Students will understand that communities do not exist in isolation, but are globally interconnected by a number of Earth systems (e.g. ocean, atmosphere, lithosphere).	SC-6-I-S-1 Students will describe and explore the biotic and abiotic factors that affect change in ecosystems SC-6-I-S-2 Students will document and describe consequences of change in one or more abiotic factors on a population within an ecosystem SC-6-I-S-3 Students will investigate how communities are interconnected, how they interact with different Earth systems, and represent these global connections/interactions in a variety of ways (e.g. writing, models, multi-media, claymation)	**SC-06-4.7.1** **Students will describe the consequences of change in one or more abiotic factors on a population within an ecosystem.** **The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition).** **DOK 2**

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
SC-7-I-U-1 Students will understand that species may become extinct even if environmental conditions remain constant. Competition between species for limited resources can result in extinction. SC-7-I-U-2 Students will understand that changes within an ecosystem may be caused by the interactions of many factors, both biotic and abiotic. Seemingly small changes can have significant consequences as their effects ripple through a community.	SC-7-I-S-1 Students will research and investigate environmental situations where small changes may have large impacts in both living and non-living components of systems (e.g., introduction of zebra mussels into the Kentucky river, planting kudzu to stabilize hillsides) SC-7-I-S-2 Students will investigate potential factors contributing to endangerment or extinction, including the effects of competition for resources SC-7-I-S-3 Students will identify a species which has become extinct and analyze data/evidence to infer the contributing factors which led to extinction SC-7-I-S-5 Students will design and conduct investigations of changes to abiotic and biotic factors in ecosystems, document and communicate observations, procedures, results and conclusions	**SC-07-4.7.1** **Students will compare abiotic and biotic factors in an ecosystem in order to explain consequences of change in one or more factors.** **The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition). Given adequate biotic and abiotic resources and no diseases or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.** **DOK 3**
SC-7-I-U-3 Students will understand that not all actions/decisions have the possibility of a desirable outcome. Sometimes a compromise requires accepting one unwanted outcome to avoid a different unwanted outcome.	SC-7-I-S-4 Students will research and discuss environmental impacts of actions (human or non-human) which necessitate choosing between undesirable alternatives (e.g., losing crops to insects vs. applying toxic pesticides)	

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
SC-8-UD-S-5 Students will identify patterns among organisms that may be used for classification and compare those patterns to the currently accepted	**SC-08-3.4.4** **Students will describe and explain patterns found within groups of organisms in order to make biological classifications of those**	

taxonomy	**organisms.** **Observations and patterns found within groups of organisms allow for biological classifications based on how organisms are related.** **DOK 2**	
SC-8-I-U-1 Students will understand that organisms both cooperate and compete in ecosystems. Balanced patterns of cooperation and competition may generate ecosystems that are relatively stable for hundreds or thousands of years.	SC-8-I-S-1 Students will predict the effects of change on one or more components within an ecosystem by analyzing a variety of data. SC-8-I-S-2 Students will analyze ecosystems to identify patterns of cooperation that enhance stability.	**SC-08-4.7.1** **Students will describe the interrelationships and interdependencies within an ecosystem and predict the effects of change on one or more components within an ecosystem.** **Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years. DOK 3**
	SC-8-I-S-1 Students will predict the effects of change on one or more components within an ecosystem by analyzing a variety of data.	**SC-08-4.7.2** **Students will:** • **explain the interactions of the components of the Earth system (e.g., solid Earth, oceans, atmosphere, living organisms);** • **propose solutions to detrimental interactions.** **Interactions among the solid Earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing Earth system.** **DOK 3**
SC-8-I-U-3 Students will understand that it is important to consider what population will benefit and what population (not	SC-8-I-S-1 Students will predict the effects of change on one or more components within an ecosystem by analyzing a	**SC-08-4.7.1** **Students will describe the interrelationships and interdependencies within an**

necessarily the same one) will bear the cost when deciding among alternative courses of action.	variety of data SC-8-I-S-4 Students will evaluate the risks and benefits of human actions affecting the environment and identify which populations will be harmed or helped. Use a variety of data/ sources to support or defend a position related to a proposed action, both orally and in writing. Analyze the validity of other arguments.	**ecosystem and predict the effects of change on one or more components within an ecosystem.** **Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.** **DOK 3**

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SC-H-I-U-1 Students will understand that human beings are part of the Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems. SC-H-I-U-2 Students will understand that unique among organisms, humans have the capability to impact other species on a global scale both directly (e.g. selective breeding, genetic engineering, foreign species introductions) and indirectly (e.g. habitat crowding, pollution, climate change).	SC-H-I-S-1 Students will explore ways to eradicate or lessen environmental problems caused by human interaction (e.g., examine programs for habitat restoration or wildlife protection, automotive/industrial emissions standards) SC-H-I-S-5 Students will analyze examples of environmental changes resulting from the introduction, removal, or reintroductions of indigenous or non-indigenous species to an ecosystem. Use information to predict future impacts of similar changes in other ecosystems SC-H-I-S-7 Students will explore the causes, consequences and possible solutions to persistent, contemporary and emerging global issues relating to environmental quality	**SC-HS-4.7.2** **Students will:** • **evaluate proposed solutions from multiple perspectives to environmental problems caused by human interaction;** • **justify positions using evidence/data.** **Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.** **DOK 3**

	SC-H-I-S-3 Students will analyze and describe the effects of events (e.g., fires, hurricanes, deforestation, mining, population growth and municipal development) on environments from a variety of perspectives. Use data to propose ways of lessening impacts perceived as negative	**SC-HS-4.7.3** **Students will:** • **predict the consequences of changes to any component (atmosphere, solid Earth, oceans, living things) of the Earth System;** • **propose justifiable solutions to global problems.** **Interactions among the solid Earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing Earth system.** **DOK 3**
SC-H-I-U-4 Students will understand that every ecosystem contains natural checks and balances, both biotic and abiotic, that serve to limit the size and range of the populations contained within it.	SC-H-I-S-2 Students will investigate changes in ecosystems and propose potential solutions to problems by documenting and communicating solutions to others through multi-media presentations SC-H-I-S-4 Students will examine existing models of global population growth and the factors affecting population change (e.g., geography, diseases, natural events, birth/death rates). Propose and defend solutions to identified problems of population change	**SC-HS-4.7.1** **Students will:** • **analyze relationships and interactions among organisms in ecosystems;** • **predict the effects on other organisms of changes to one or more components of the ecosystem.** **Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.** **DOK 3** **SC-HS-4.7.5** **Students will:** • **predict the consequences of changes in resources to a population;** • **select or defend solutions to real-world problems of population control.** **Living organisms have the capacity to produce populations of infinite size. However, behaviors, environments and resources influence the size of populations. Models (e.g., mathematical, physical, conceptual) can be used to make predictions about changes in the size or rate of growth of a**

		population. **DOK 3**

SOCIALSTUDIES

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SS-P-GC-U-2 Students will understand that citizens of local communities have certain rights and responsibilities in a democratic society.	**SS-P-GC-S-2** Students will explore personal rights and responsibilities: **a)** explain, demonstrate, give examples of ways to show good citizenship at school and in the community (e.g., recycling, picking up trash) **b)** describe the importance of civic participation and locate examples (e.g., donating canned food to a class food drive) in current events/news	*SS-EP-1.3.1* *Students will define basic democratic ideas (e.g., liberty, justice, equality, rights, responsibility) and explain why they are important today.* **SS-EP-1.3.2** **Students will identify and give examples of good citizenship at home, at school and in the community (e.g., helping with chores, obeying rules, participating in community service projects such as recycling, conserving natural resources, donating food/supplies) and explain why civic engagement in the community is important.** **DOK 2**

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
SS-4-GC-U-3 Students will understand that all citizens of Kentucky have rights and responsibilities as members of a democratic society, including civic participation.	**SS-4-GC-S-2** Students will explore rights and responsibilities: **a)** describe, give examples, and compare rights and responsibilities **b)** describe the benefits of citizenship and find examples of citizenship in current events/news media	**SS-04-1.3.1** **Students will identify the basic principles of democracy (e.g., justice, equality, responsibility, freedom) found in Kentucky's Constitution and explain why they are important to citizens today.** **DOK 2** **SS-04-1.3.2** **Students will describe specific rights and responsibilities individuals have as citizens of Kentucky (e.g., voting in statewide elections, participating in state service projects, obeying state laws) and explain why civic engagement is necessary to preserve a democratic society.** **DOK 2**

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
SS-5-GC-U-5 Students will understand that as members of a democratic society, all citizens of the United States have certain rights and responsibilities, including civic participation.	**SS-5-GC-S-4** Students will investigate the rights and responsibilities of U.S. citizens: **a)** describe and give examples of specific rights guaranteed to all U.S. citizens in the Bill of Rights (e.g., freedom of religion, freedom of speech, freedom of press) and explain why they are important today **b)** describe some of the responsibilities U.S. citizens have in order for democratic governments to function effectively (e.g. voting, community service, paying taxes) and find examples of civic participation in current events/news (e.g., television, radio, articles, Internet)	**SS-05-1.3.2** **Students will describe specific rights and responsibilities individuals have as citizens of the United States (e.g., voting in national elections) and explain why civic engagement is necessary to preserve a democratic society.** **DOK 3**

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
SS-8-GC-U-5 Students will understand that as members of a democratic society, all citizens of the United States have certain rights and responsibilities, including civic participation.	**SS-8-GC-S-4** Students will explain pros and cons of how citizen responsibilities (e.g., participate in community activities, vote in elections) and duties (e.g., obey the law, pay taxes, serve on a jury, register for the military) impact the U.S. government's ability to function as a democracy **SS-8-GC-S-5** Students will analyze information from a variety of print and non-print sources (e.g., books, documents, articles, interviews, Internet) to research answers to questions and explore issues	**SS-08-1.3.1** **Students will explain and give examples of how significant United States documents (Declaration of Independence, Constitution, Bill of Rights) established democratic principles and guaranteed certain rights for all citizens.** **DOK 2** **SS-08-1.3.2** **Students will explain and give examples of how, in order for the U.S. government to function as a democracy, citizens must assume responsibilities (e.g., participating in community activities, voting in elections) and duties (e.g., obeying the law, paying taxes, serving on a jury, registering for the military)** **DOK 2**

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
SS-H-GC-U-4 Students will understand that all citizens of the United States have certain rights and responsibilities as members of a democratic society.	**SS-H-GC-S-1** Students will demonstrate an understanding (e.g., illustrate, write, model, present, debate) of the nature of government: **a)** examine ways that democratic governments do or do not preserve and protect the rights and liberties of their constituents (e.g., U.N. Charter, Declaration of the Rights of Man, U.N. Declaration of Human Rights, U.S. Constitution) **b)** **SS-H-GC-S-3** Students will investigate the rights of individuals (e.g., Freedom of Information Act, free speech, civic responsibilities in solving global issues) to explain how those rights can sometimes be in conflict with the responsibility of the government to protect the "common good" (e.g., homeland security issues, environmental regulations, censorship, search and seizure), the rights of others (e.g., slander, libel), and civic responsibilities (e.g., personal belief/responsibility versus civic responsibility) **SS-H-GC-S-4** Students will evaluate the impact citizens have on the functioning of a democratic government by assuming responsibilities (e.g., seeking and assuming leadership positions, voting) and duties (e.g., serving as jurors, paying taxes, complying with local, state and federal laws, serving in the armed forces) **SS-H-GC-S-5** Students will analyze and synthesize a variety of information from print and non-print sources (e.g., books, documents, articles, interviews, Internet, film, media) to research issues, perspectives and solutions to problems	**SS-HS-1.3.1** **Students will explain and give examples how the rights of one individual (e.g., smoking in public places, free speech) may, at times, be in conflict (e.g., slander, libel) with the rights of another.** **DOK 2** SS-HS-1.3.2 Students will explain how the rights of an individual (e.g., Freedom of information Act, privacy) may, at times, be in conflict with the responsibility of the government to protect the "common good" (e.g., homeland security issues, environmental regulations, censorship, search and seizure). **DOK 2** SS-HS-1.3.3 Students will evaluate the impact citizens have on the functioning of a democratic government by assuming responsibilities (e.g., seeking and assuming leadership positions, voting) and duties (e.g., serving as jurors, paying taxes, complying with local, state and federal laws, serving in the armed forces).

PRACTICAL LIVING

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
VS-P-CD-U-3 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-P-CD-S-4** Students will describe how consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by: **a)** describing some community activities that promote healthy environments	**PL- EP-3.1.4** **Students will identify consumer actions (reusing, reducing, recycling) that impact the environment.** **DOK 1** *PL-EP-3.1.5* *Students will identify the available health and safety agencies in a community that provide services:* • *Health department* • *Fire department* • *Sanitation* • *Police* • *Ambulance services*

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
VS-4-CD-U-4 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-4-CD-S-4** Students will evaluate consumer actions (e.g., reusing, reducing, recycling) and how they influence the use of resources and impact the environment by: **a)** describing how consumption, conservation, and waste management practices are related **b)** identifying ways the physical environment is related to individual and community health	**PL-04-3.1.4** **Students will identify and describe consumer actions (reusing, reducing, recycling) that impact the environment.** **DOK 2** *PL-04-3.1.5* *Students will identify and explain the available health and safety agencies in a community that provide services:* • *Health department* • *Fire department* • *Sanitation* • *Police* • *Ambulance services*

Program of Studies: Understandings	Program of Studies: Skills and Concepts	Related Core Content for Assessment
VS-5-CD-U-4 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-5-CD-S-4** Students will describe how consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by: **a)** describing some community	**PL-05-3.1.4** **Students will describe consumer actions (reusing, reducing, recycling) and identify ways these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste)**

	activities that promote healthy environments	**DOK 2** *PL-05-3.1.5* ***Students will identify and describe the available health and safety agencies in a community that provide services:*** • *Health department* • *Fire department* • *Sanitation* • *Police* • *Ambulance services*

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
VS-6-CD-U-4 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-6-CD-S-4** Students will evaluate ways consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by: **a)** using resources from home, school, and community that provide accurate and relevant health information **b)** describing the influence of environmental factors that positively and negatively affect health **c)** researching and describing services provided by environmental agencies (e.g., Soil Conversation, Environmental Protection Agency, KY Department of Natural Resources) **d)** investigating conservation issues related to consumption and waste management practices	**PL-06-3.1.4** **Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy).** **DOK 2**

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
VS-7-CD-U-4 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-7-CD-S-4** Students will evaluate ways consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by:	**PL-07-3.1.4** **Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g.,**

	a) describing the influence of environmental factors that positively and negatively affect health **b)** researching local and state environmental issues that address consumption for conservation and waste management practices	**conserving resources, reducing pollution, reducing solid waste, conserving energy).** **DOK 2**

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
VS-8-CD-U-5 Students will understand that consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment.	**VS-8-CD-S-4** Students will evaluate ways consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by: **a)** describing the influence of environmental factors that positively and negatively affect health **b)** researching local and state environmental issues that address consumption for conservation and waste management practices	**PL-08-3.1.4** **Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy).** **DOK 2**

Program of Studies: Understandings	**Program of Studies: Skills and Concepts**	**Related Core Content for Assessment**
VS-H-CD-U-6 Students will understand that consumer actions influence the use of resources and the impact they have on the environment.	**VS-H-CD-S-6** Students will evaluate consumer actions (e.g., reuse, reduce, recycle, choosing renewable energy sources, using biodegradable packaging materials, composting) and analyze how these actions impact the environment (e.g., conserving resources, reducing water, air, and land pollution, reducing solid waste, conserving energy, greenhouse effect, slowing global warming) by: **a)** describing the influence of environmental factors that positively and negatively affect health **b)** researching local, state, national and international environmental issues that address consumption for conservation and waste	**PL-HS-3.1.4** **Students will compare consumer actions (reuse, reduce, recycle, choosing renewable energy sources, using biodegradable packaging materials, composting) and analyze how these actions impact the environment (e.g., conserving resources; reducing water, air, and land pollution; reducing solid waste; conserving energy).** **DOK 3**

	management practices	

Other Practical Living Program of Studies

VS-4-CD-U-5
Students will understand that an individual has multiple life roles that impact responsibility to be a valuable family and community member.

VS-5-CD-U-5
Students will understand that an individual has multiple life roles that impact responsibility to be a valuable family and community member.

SECRET SINK

SUBJECTS: Science, Social Studies, English/Language Arts, Health, Physical Education, Consumerism

GRADES: 6-8

DURATION: One to three 45-60 minute periods

GROUP SIZE: 20-30 students working in small groups

SETTING: Indoors or outside at tables

KEY VOCABULARY: Karst, sinkholes, groundwater, spring, run-off, pollution, community

ANTICIPATORY SET: Today we are going to look at a place called Secret Sink and develop a community around it. What kinds of things do we find in a community? How can all aspects of a community work together to create a healthy, productive place to live and work?

OBJECTIVES: The students will be able to: 1) develop and express rights and responsibilities for themselves and others; 2) investigate alternative perspectives; 3) work together in a decision making and problem solving situation by applying multiple perspectives.

MATERIALS: Scissors; masking tape; glue; surface map that includes a river, spring, and sinkhole (one per group); Secret Sink Community Sheet (one per group).

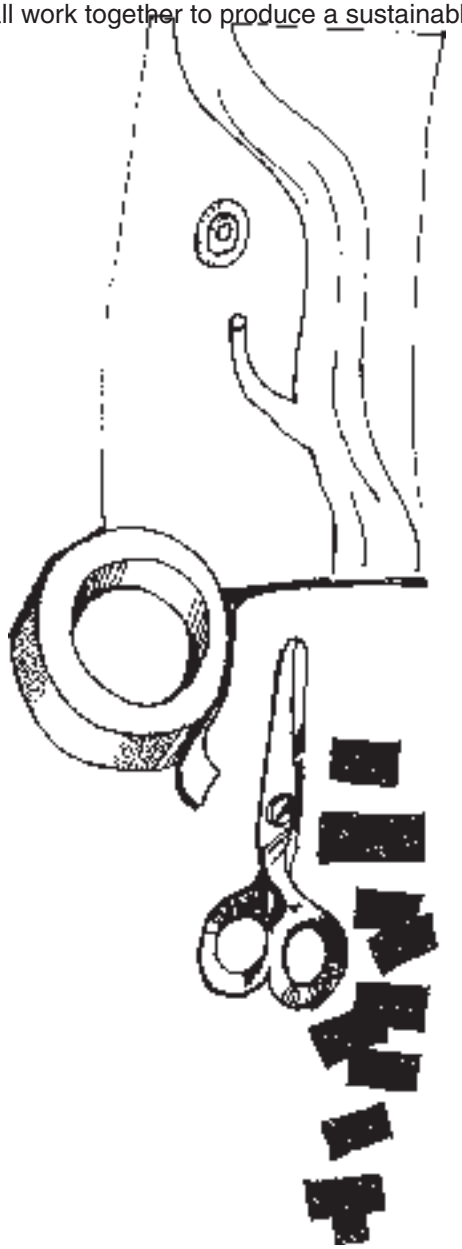
SECRET SINK

BACKGROUND: All land use can dramatically affect an area. This is particularly true in a karst area. A karst area is distinguishable by the lack of surface streams and an abundance of sinkholes and springs. Following the properties of gravity, water consistently travels to the lowest point, the water table. In most areas of the United States the water travels along the surface as a stream or river. But in a karst area the water is more likely to sink underground to form sub-surface streams or rivers. Underground water may travel many miles before exiting as a spring near or along a surface river.

In a karst landscape, water drains underground by flowing into depressions called sinkholes. Sinkholes are areas where underlying rock layers have given way, causing the upper layers of rock to develop cracks and collapse. Karst terrain is very susceptible to groundwater pollution due to the many sinkholes on the surface that quickly drain water into underground rivers.

When discussing land development in a karst region numerous issues should be addressed. All uses for land can dramatically affect an area, but the problems of groundwater pollution and an increasing human population have the most dramatic impacts on a given area. This is particularly true in a karst area where the abundance of sinkholes can funnel not only surface water but also all types of pollution into the groundwater. This run-off, or drainage of water and water carried pollution, can create major community problems. Because of its numerous surface cracks and holes, a rainstorm within a karst terrain can swiftly wash soils, farming chemicals (including fertilizers, insecticides, pesticides, etc.), or animal waste from adjacent farm land into the underground waterways. Oil and gas residues can wash off area roadways or railway lines. Broken sewage or septic lines can carry human wastes into the underlying water table. If a residential well intercepts these underground streams, the polluted waters can be brought into area homes without the necessary filtration or cleansing. This affects the health and well being of the community.

A community's greatest challenge is to develop a relationship with its surroundings so both can thrive. Planning is the key to a successful partnership with the land. By understanding the workings of a karst terrain and the vital role that water plays in this environment people can make informed decisions to insure that pre-existing plant and animal communities are not greatly disturbed. In the Secret Sink Community industry, agriculture, and general services must all work together to produce a sustainable environment.



PROCEDURE:

1. Tell the students that they are responsible for planning a new community in the Secret Sink region. All components of the community must be arranged so that it maximizes the usefulness of this region. The teacher reviews what needs to be developed and the importance of not leaving out any aspects of the community.

2. Divide the class into groups of three to five students. Each group represents a town planning committee. Working together as a team, their job is to plan the "perfect" community -- a community which provides a clean, healthy environment for all its residents as well as the pre-existing plant and animal life.

3. Review the components of the community*:

Residents – live in the area
Farmers – use the land to raise tobacco and livestock
Industry – uses the land for economic growth and trade
Small Businesses – provide local services
National Park – preserves and protects the unique environment
Transportation Department – insures appropriate transportation throughout the community. This can include highways, railroads and/or water transportation
Environmental Groups – protect the sinkholes under any circumstances
*Other groups can be added.

4. Before the students cut out the materials, "brainstorm" the pros and cons of land use in the Secret Sink community. Record the pros and cons on the board. The table below shows a few examples:

5. Pass out the surface maps, scissors, glue, and the Secret Sink Community Sheets. The surface maps will serve as a base for each group's community. Explain that the group will need to use all the building cutouts provided. These cutouts can be made smaller or they can include more land, but all pieces must be used. The students may also develop other land uses. **Do not paste items down at this time.**

6. Have students work in their groups and begin to develop their ideal community. While doing this, keep in mind the priorities of each community group. Remember no land use is to be excluded, all community buildings must be used, plant and animal habitats need to be preserved, and everyone in your group should agree. Once all community members agree to the best layout, the pieces should be pasted or taped in place.

7. After each land use plan has been completed, each group now shares their "ideal" community with the rest of the class. During each presentation, community members should explain why they chose the placement of each component of their community. They should also explain how the placement of individual components helps protect, preserve, and maintain the health and well being of other community components.

8. As each presentation is completed, the teacher should tape or hang each completed community along the board or wall of the classroom. Place communities side by side until each group has completed their presentations. Next, have the class focus on the string of communities found along the river. Point out that each represents a town, city, or farming community found along the Green River. Individual components of any one community may protect other components within its town limits, but how do they affect the next community downstream? Did the individual planning committees think about other communities while working on the layout of their own town? Are there different choices that would have made a difference to neighboring communities?

   NOTE: There is no "perfect" community. Every community will affect the plant and animal habitats around it, but proper planning can help to alleviate many environmental consequences.

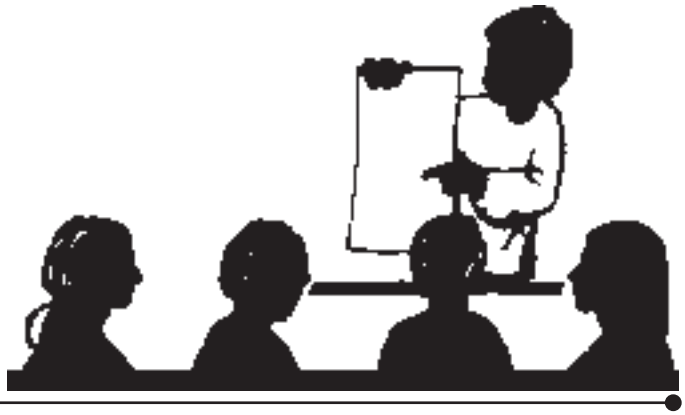
9. To show that our Secret Sink community is not isolated, the teacher uses a U.S. map to show that the Green River flows into the Ohio River which flows into the Mississippi River which flows into the Gulf of Mexico. Now, as we look at our community, how are we affecting other communities down river and around the world?

CLOSURE: Secret Sink is a special community. All communities have differences that make them unique. As community planners we need to take these special attributes into consideration. No community is an island. Each has its impact on many environments.

EVALUATION: The teacher is able to evaluate the students by observing how the students interact with each other in their groups. Through the students' presentations and discussions the teacher will be able to evaluate their problem solving skills and how well they adapt to different perspectives.

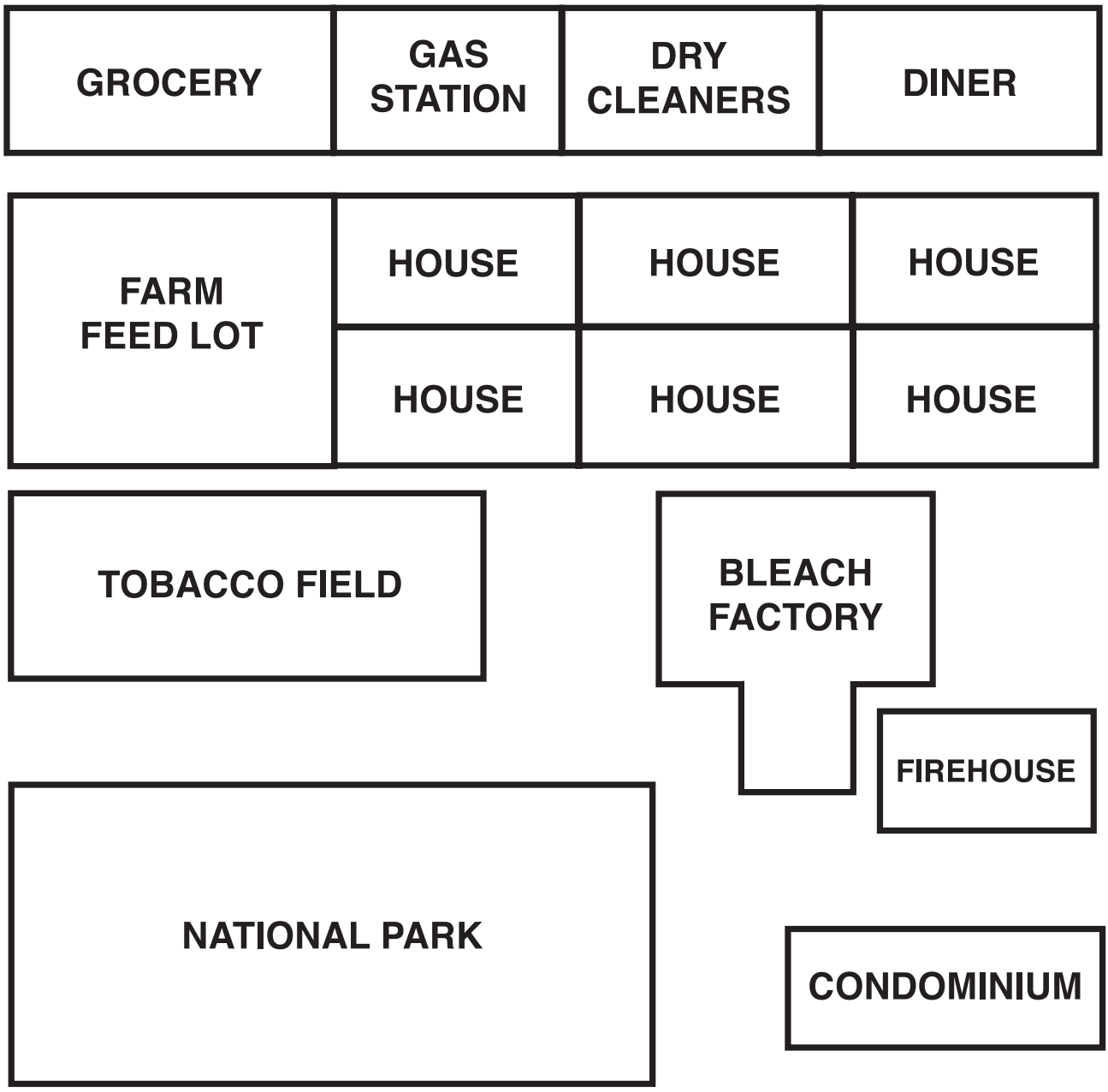
EXTENSIONS:

1. Relate Secret Sink to a sinkhole or other potentially hazardous area in or near your community. How is it being used? What kinds of connections can you make?
2. Find articles in local newspapers relating to sinkholes. What problems, concerns, and/or solutions are being discussed?
3. Attend a town meeting to see how your community discusses and plans for your area's development.
4. Brainstorm some changes that could be made within your school community. Prepare your ideas and present then to your school's student council.



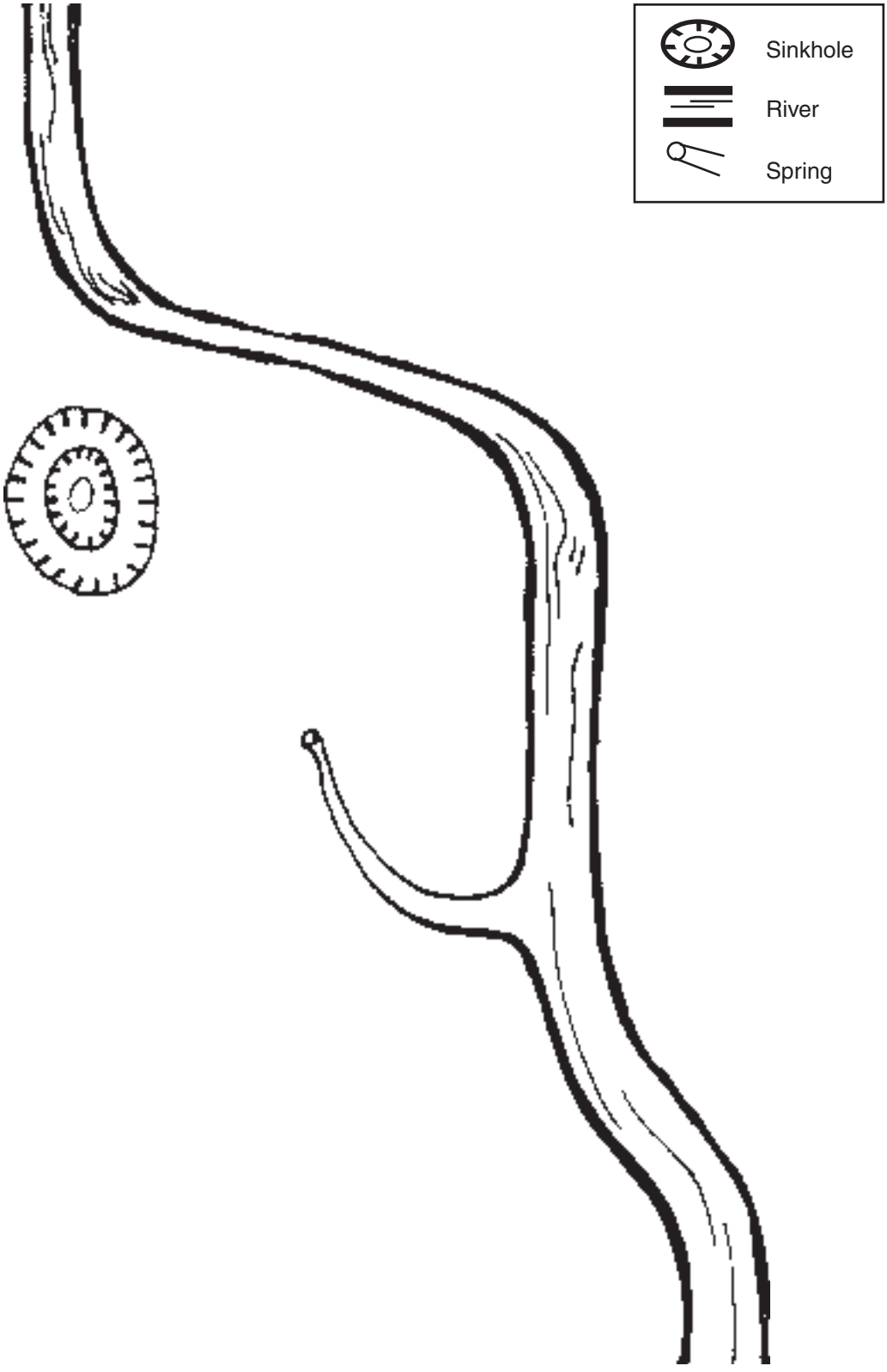
SECRET SINK

COMMUNITY SHEET



SECRET SINK

MAP



Activity Title: Secret Sink

Source: Mammoth Cave National Park's *Making Connections*

Related Stormwater Activities from *Making Connections*:

- **Soda Sink, p. 25**

Core Content

Elementary

Science

SC-05-2.3.2
Students will explain interactions of water with Earth materials and results of those interactions (e.g., dissolving minerals, moving minerals and gases).

SC-05-3.5.1
Students will describe cause and effect relationships between enhanced survival/reproductive success and particular biological adaptations (e.g., changes in structures, behaviors, and/or physiology) to generalize about the diversity of species.

Biological change over time accounts for the diversity of species developed through gradual processes over many generations. Examining cause and effect relationships between enhanced survival/reproductive success and biological adaptations (e.g., changes in structures, behaviors, and/or physiology), based on evidence gathered, creates the basis for explaining diversity.
DOK 2

SC-05-4.7.1
Students will:

- describe and categorize populations of organisms according to the function they serve in an ecosystem (e.g., producers, consumers, decomposers);
- draw conclusions about the effects of changes to populations in an ecosystem.

Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some microorganisms are producers because they make their own food. All animals, including humans, are consumers, and obtain their food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an

ecosystem. Using data gained from observing interacting components within an ecosystem, the effects of changes can be predicted.
DOK 3

SC-05-4.7.2
Students should understand that a population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

Middle

Science

SC-06-2.3.3
Students will compare constructive and destructive forces on Earth in order to make predictions about the nature of landforms.

Landforms are a result of a combination of constructive and destructive forces. Collection and analysis of data indicates that constructive forces include crustal deformation, faulting, volcanic eruption and deposition of sediment, while destructive forces include weathering and erosion.
DOK 2

SC-06-3.5.1
Students will explain that biological change over time accounts for the diversity of species developed through gradual processes over many generations.

Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.
DOK 2

SC-06-4.7.1
Students will describe the consequences of change in one or more abiotic factors on a population within an ecosystem.

The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition).
DOK 2

SC-07-4.7.1
Students will compare abiotic and biotic factors in an ecosystem in order to explain consequences of change in one or more factors.

The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition). Given adequate biotic and abiotic resources and no diseases or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.
DOK 3

SC-08-3.5.1
Students will draw conclusions and make inferences about the consequences of change over time that can account for the similarities among diverse species.

The consequences of change over time provide a scientific explanation for the fossil record of ancient life forms and for the striking molecular similarities observed among the diverse species of living organisms.
DOK 3

Social Studies

SS-06-2.3.2
Students will explain how compromise and cooperation are possible choices to resolve conflict among individuals and groups in the present day.
DOK 2

SS-06-4.1.2
Students will describe how different factors (e.g., rivers, mountains, plains) affect where human activities are located in the present day.

SS-06-4.2.1
Students will describe how regions in the present day are made distinctive by human characteristics (e.g., dams, roads, urban centers) and physical characteristics (e.g., mountains, bodies of water, valleys) that create advantages and disadvantages for human activities (e.g., exploration, migration, trade, settlement, development).
DOK 2

SS-06-4.4.3
Students will explain how the natural resources of a place or region impact its political, social and economic development in the present day.

SS-06-4.4.4
Students will explain how individual and group perspectives impact the use of natural resources (e.g., urban development, recycling) in the present day.

SS-06-4.4.2
Students will describe ways in which the physical environment (e.g., natural resources, physical geography, natural disasters) both promotes and limits human activities (e.g., exploration, migration, trade, settlement, development) in the present day.
DOK 2

Practical Living/Vocational Studies

PL-06-1.1.1
Students will describe the importance of effective social interaction skills (e.g., respect, self-advocacy, cooperation, communication, identifying and being open to different perspectives and points of view, empathy, friendship).
DOK 2

PL-06-1.1.2
Students will recommend effective strategies (e.g., communication, problem solving, decision making, refusal skills, anger management, conflict resolution) for responding to stress, conflict, peer pressure, and bullying.
DOK 2

PL-06-2.2.5
Students will identify rules of behavior and fair play (e.g., accepting authoritative decisions, assessing one's own performance level, accepting skills and abilities of others through verbal and nonverbal actions for spectators and/or participants) that are necessary during games and sports.

PL-06-3.1.4
Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy).
DOK 2

PL-06-3.1.5
Students will identify and describe a range of resources and services provided by community agencies:
- Public health department
- Fire department
- Police department
- Family resource center

PL-07-1.1.1
Students will explain the importance of effective social interaction skills (e.g., respect, self-advocacy, cooperation, communication, identifying and being open to different perspectives and points of view, empathy, friendship).
DOK 2

PL-07-1.1.2
Students will recommend and justify effective strategies (e.g., communication, problem solving, decision making, refusal skills, anger management, conflict resolution) for responding to stress, conflict, peer pressure, and bullying.
DOK 2

PL-07-2.2.5
Students will identify rules of behavior and fair play (e.g., accepting authoritative decisions, assessing one's own performance level, accepting skills and abilities of others through verbal and nonverbal actions for spectators and/or participants) that are necessary during games and sports.

PL-07-3.1.4
Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy).
DOK 2

PL-07-3.1.5
Students will identify and describe resources and services provided by community agencies:

- Public health department
- Fire department
- Police department
- Family resource center

PL-08-1.1.1
Students will explain the importance of effective social interaction skills (e.g., respect, self-advocacy, cooperation, communication, identifying and being open to different perspectives and points of view, empathy, friendship).
DOK 2

PL-08-1.1.2
Students will recommend and justify effective strategies (e.g., communication, problem solving, decision making, refusal skills, anger management, conflict resolution, relaxation techniques, time management) for responding to stress, conflict, peer pressure, and bullying.
DOK 2

PL-08-2.2.5
Students will analyze the value of rules of behavior and fair play (e.g., accepting authoritative decisions, assessing one's own performance level, accepting skills

and abilities of others through verbal and nonverbal actions for spectators and/or participants) during games and sports.

PL-08-3.1.5
Students will identify and explain the importance of resources and services provided by community agencies and how these resources benefit the overall community.
- Public health department
- Fire department
- Police department
- Family resource center

PL-08-3.1.4
Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy).
DOK 2

Program of Studies

Elementary

Science

SC-5-EU-S-4
Students will explore the concept of watersheds and identify factors that impact them, including results of interactions of water with earth materials (e.g., dissolving minerals, moving minerals and gases)

SC-5-BC-S-2
Students will investigate and describe adaptations of various organisms to their environments through observations as well as print and non-print based resources.

SC-5-BC-S-3
Students will investigate ways that organisms cope with fluctuations (e.g. temperature, precipitation, change in food sources) in their environments.

SC-5-BC-S-4
Students will propose explanations regarding adaptations of populations to environments citing evidence/data to support conclusions.

SC-5-I-S-2
Students will identify the role/function a population of organisms has in a particular community/ecosystem (e.g., producers, consumers, decomposers).

SC-5-I-S-3
Students will explore the cause/effect relationship of altering a particular population of organisms within an ecosystem using data/evidence collected through research and/or simulations (e.g., role-play games, computer-based simulations).

Middle

Science

SC-6-EU-S-3
Students will investigate constructive and destructive forces at work on the Earth's surface and the landforms that result from them.

SC-6-BC-S-1
Students will investigate how small differences between parents and offspring can accumulate over time, eventually resulting in a wide variety of types of organisms with different characteristics from their different ancestors.

SC-6-I-S-1
Students will describe and explore the biotic and abiotic factors that affect change in ecosystems.

SC-6-I-S-2
Students will document and describe consequences of change in one or more abiotic factors on a population within an ecosystem.

Social Studies

SS-6-CS-S-4
Students will describe conflicts between individuals or groups and explain how compromise and cooperation are possible choices to resolve conflict among individuals and groups in the United States and across regions of the world in the present day.

SS-6-G-S-3
Students will investigate interactions among human activities and the physical environment in the present day:

- explain cause and effect relationships between the natural resources of a place or region and its political, social, and economic development

SS-6-G-S-3
Students will investigate interactions among human activities and the physical environment in the present day:

a) explain how people modify the physical environment (e.g., dams, roads, bridges) to meet their needs in different regions.

b) describe how the physical environment can promote or restrict human activities (e.g., exploration, migration, trade, settlement, development) in the present day.

Practical Living/Vocational Studies

PL-6-PW-S-SMEH1
Students will demonstrate social interaction skills by:

a) using appropriate means to express needs, wants and feelings

b) using and describe the importance of effective social interaction skills (e.g., respect, self-advocacy, cooperation, communication, identifying and being open to different perspectives and points of view, empathy, friendship)

c) recommending effective strategies for responding to stress, conflict, peer pressure and bullying

d) interpreting how individuals impact the effective functioning of groups

PL-6-LPW-S-7
Students will when participating in a variety of physical activities, sports and games:

a) identify and apply rules of behavior and fair play (e.g., accepting authoritative decisions, assessing one's own performance level, accepting skills and abilities of others through verbal and nonverbal actions for spectators and/or participants)

b) demonstrate sportsmanship, cooperation, teamwork and conflict resolution

VS-6-CD-S-4
Students will evaluate ways consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by:

a) using resources from home, school, and community that provide accurate and relevant health information

b) describing the influence of environmental factors that positively and negatively affect health

c) researching and describing services provided by environmental agencies

PL-7-PW-S-SMEH1
Students will demonstrate social interaction skills by:

a) using appropriate means to express needs, wants and feelings

b) using and explaining the importance of effective social interaction skills (e.g., respect, self-advocacy, cooperation, communication, identifying and

being open to different perspectives and points of view, empathy, friendship)

c) recommending and justify effective strategies (e.g., problem solving, decision making, refusal skills, anger management, conflict resolution) for responding to stress, conflict, peer pressure and bullying

d) interpreting how individuals impact the effective functioning of groups

PL-7-PW-S-SMEH2
Students will demonstrate the ability to apply a decision-making process to health issues and problems individually and collaboratively.

PL-7-LPW-S-7
Students will when participating in a variety of physical activities, sports and games:

a) identify and apply rules of behavior and fair play (e.g., accepting authoritative decisions, assessing one's own performance level, accepting skills and abilities of others through verbal and nonverbal actions for spectators and/or participants)

b) demonstrate sportsmanship, cooperation, teamwork and conflict resolution

VS-7-CD-S-4
Students will evaluate ways consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by:

a) describing the influence of environmental factors that positively and negatively affect health

b) researching local and state environmental issues that address consumption for conservation and waste management practices

PL-8-PW-S-SMEH1
Students will demonstrate social interaction skills by:

a) using appropriate means to express needs, wants and feelings

b) using and explaining the importance of effective social interaction skills (e.g., respect, self-advocacy, cooperation, communication, identifying and being open to different perspectives and points of view, empathy, friendship)

c) recommending and justifying effective strategies (e.g., problem solving, decision making, refusal skills, anger management, conflict resolution) for responding to stress, conflict, peer pressure and bullying

d) interpreting how individuals impact the effective functioning of groups

PL-8-LPW-S-7
Students will when participating in a variety of physical activities, sports and games:

a) identify and apply rules of behavior and fair play (e.g., accepting authoritative decisions, assessing one's own performance level, accepting skills and abilities of others through verbal and

b) nonverbal actions for spectators and/or participants)
c) demonstrate sportsmanship, cooperation, teamwork and conflict resolution

VS-8-CD-S-4
Students will evaluate ways consumer actions (e.g., reusing, reducing, recycling) influence the use of resources and impact the environment by:

a) describing the influence of environmental factors that positively and negatively affect health
b) researching local and state environmental issues that address consumption for conservation and waste management practices

CORE CONTENT

PL-M-3.3.2 Improving environmental conditions (e.g., air and water quality) and preserving natural resources impact personal and community health.

PL-M-3.3.1 A range of resources and services are provided by community agencies such as: public health department, fire department, police department, family resource centers, hospitals, and nonprofit organizations (e.g., American Heart Association, American Red Cross, American Cancer Society).

PL-M-3.1.5 Environmental issues (e.g., pollution) should be considered when making consumer decisions (e.g., recycling, reducing, reusing).

PL-M-2.3.2 Rules of behavior and fair play (e.g., accepting authoritative decisions, assessing one's own performance level, accepting skills and abilities of others through verbal and nonverbal actions for spectators and/or participants) during games are necessary.

PL-M-1.8.4 Using appropriate coping strategies (e.g., realistic goal-setting, effective time management, decision-making processes) promotes mental and emotional health.

PL-M-1.8.3 Strategies (e.g., walking away, communication skills, conflict resolution) for preventing violence vary with the situation.

PL-M-1.8.1 The use of appropriate strategies (e.g., assertiveness, refusal skills, decision-making techniques) are positive ways to cope with peer pressure.

PL-M-1.1.1 Individuals have personal rights and responsibilities (e.g., cooperation, communication, patience) when dealing with others (e.g., families, classmates, teams).

SC-M-3.5.4 The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition). Given adequate biotic and abiotic resources and no diseases or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.

SC-M-3.5.2 Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some microorganisms are producers because they make their own food. All animals, including humans, are consumers, and obtain their food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.

SC-M-3.5.1 A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

SC-M-3.4.1 Biological change over time accounts for the diversity of species developed through gradual processes over many generations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

SC-M-2.1.5 Water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. Water dissolves minerals and gases and may carry them to the oceans.

CORE CONTENT

SS-M-4.4.4 Individual perspectives impact the use of natural resources (e.g., watering lawns, planting gardens, recycling paper).

SS-M-4.4.3 The natural resources of a place or region impact its political, social, and economic development.

SS-M-4.4.2 The physical environment both promotes and limits human activities (e.g., exploration, migration, trade).

SS-M-4.2.2 Places and regions change over time as new technologies, resources, and knowledge become available.

SS-M-4.2.1 Places can be made distinctive by human activities (e.g., building houses, stores, roads, railroads, irrigation) that alter physical features.

SS-M-4.1.2 Different factors (e.g., rivers, dams, developments) affect where human activities are located and how land is used in urban, rural, and suburban areas.

SS-M-2.4.2 Compromise and cooperation are possible choices for positive social interaction and resolution of conflict.

SS-M-2.3.1 Various human needs are met through interaction in and among social institutions and groups (e.g., family, schools, teams, clubs, religious groups, governments).

WR-M-1.4 Transactive writing is informative/persuasive writing that presents ideas and information for authentic audiences to accomplish realistic purposes like those students will encounter in their lives. In transactive writing, students will write in a variety of forms such as the following:

- letters
- speeches
- editorials
- articles in magazines, academic journals, newspapers
- proposals
- brochures
- other kinds of practical/workplace writing.

Characteristics of transactive writing may include :

- text and language features of the selected form
- information to engage/orient the reader to clarify and justify purposes
- ideas which communicate the specific purpose for the intended audience
- explanation and support to help the reader understand the author's purpose
- well-organized idea development and support (e.g., facts, examples, reasons, comparisons, anecdotes, descriptive detail, charts, diagrams, photos/pictures) to accomplish a specific purpose
- effective conclusions.